

## Making 3D matrix

- Each cell has 2D matrix. Overall, there are 84 cell for each note respectively
- Each row of matrix represents separate spectrum

z - хранит звуковой сигнал в массиве

Ns - кол-во отчетов при вырезке

Nn - кол-во нот

```
clear all
close all
path = "D:\Desktop\Studie\Diploma\GIT Matlab\Audio data\wav";
path1 = path + "\Sasha\Steinway Grand Piano 70.wav";
path2 = path + "\Sasha\Yamaha Grand Piano 70.wav";
[y, Fs] = audioread(path1);
z = y(:,1);
clear y
```

Константы

```
Nn = 84;
Ns = 1024;

Tab_F_1 = [65.41  69.3   73.42  77.78  82.41  87.31  92.5   98   103.83 110   116.54 123.47];
k = 2.^ (0:6);

Tab_F = k' * Tab_F_1;
FlatTab_F = reshape(Tab_F.',1,[]);
```

Создаю объект Q, в котором будет сохранен 3Д объект

```
t_one = 2; % Одна нота длится 2 секунды
dt = 1/Fs; % Время между отчетами
t_min = Ns*dt; % Время вырезки
N_row = floor(t_one/t_min); % Количество вырезок за 2 секунды

Q = zeros(Nn, N_row, Ns);
```

Заполняю объект

Первый цикл - выделяю сигнал одной ноты

Второй цикл - разделяю выделенный сигнал на кол-во спектров

```
for i = 1:Nn

    N_sam_one = 2*Fs*t_one;      % Кол-во отчетов на 4 секунды (1нота и пауза)
    N1 = N_sam_one * (i-1) + 1;    % Сдвиг сигнала по нотам
```

```

N2 = N1 + N_sam_one - 1;

z1 = z(N1:N2);

for j = 1:N_row

    N1 = Ns * (j-1) + 1;
    N2 = N1 + Ns - 1;

    z2 = z1(N1:N2);

    Spec = fft(z2);
    Q(i, j, :) = Spec;

end

end

% save('Spectra_each_note.mat', 'Q');

```

Проверка объекта, посмотрю на некоторые спектры

```

cnt = 1;
for i = 50:51

    for j = 1:N_row

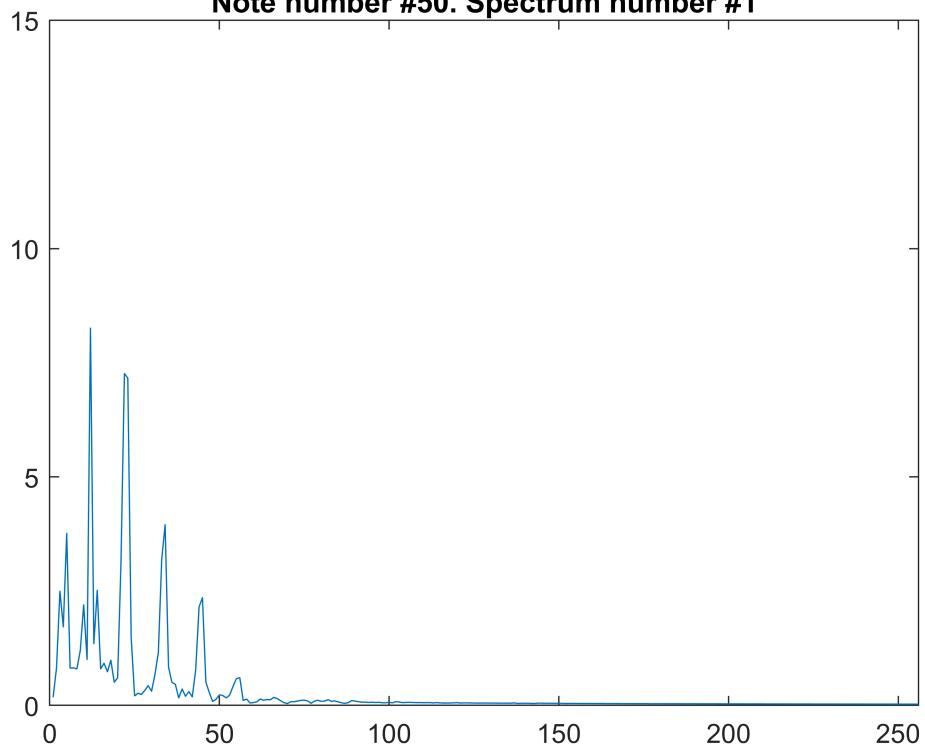
        sig = Q(i, j, :);
        sig = squeeze(sig);      % Reduce dimentions 1x1x1024 --> 1024

        figure (cnt)
        plot(abs(sig))
        title("Note number #" + string(i) + '. Spectrum number #' + string(j))
        xlim([0 Ns/4])
        ylim([0 15])

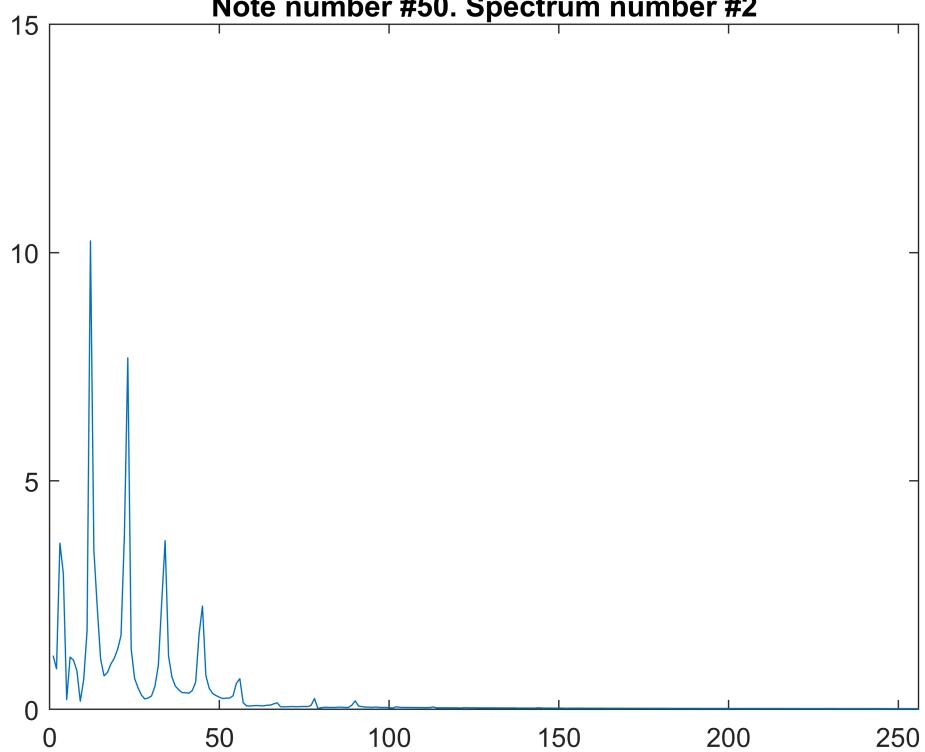
        cnt = cnt+1;
    end
end

```

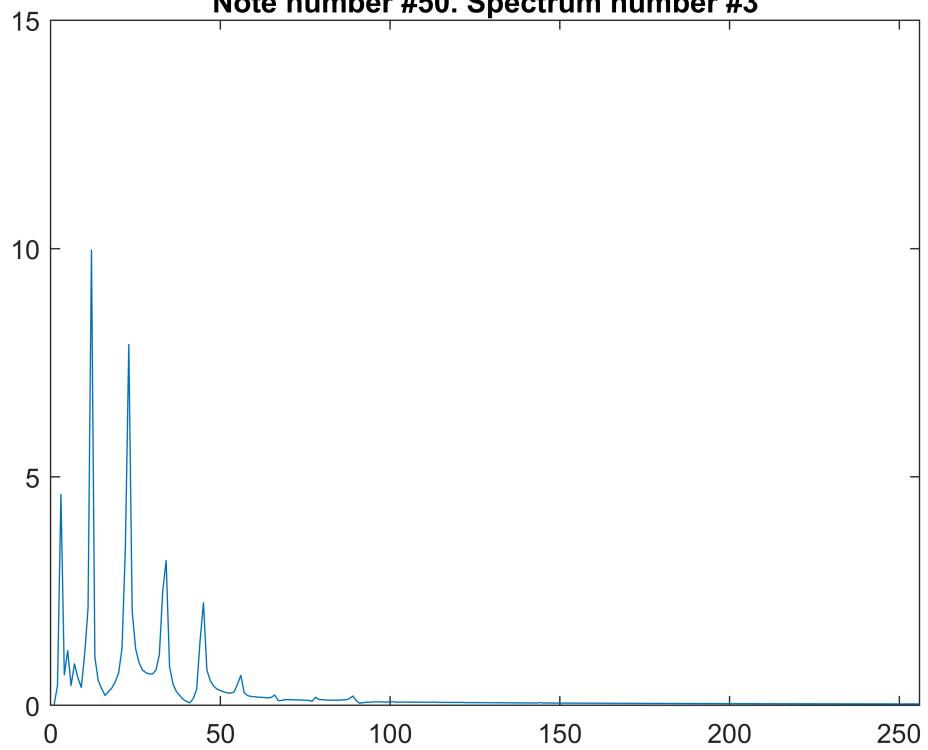
**Note number #50. Spectrum number #1**



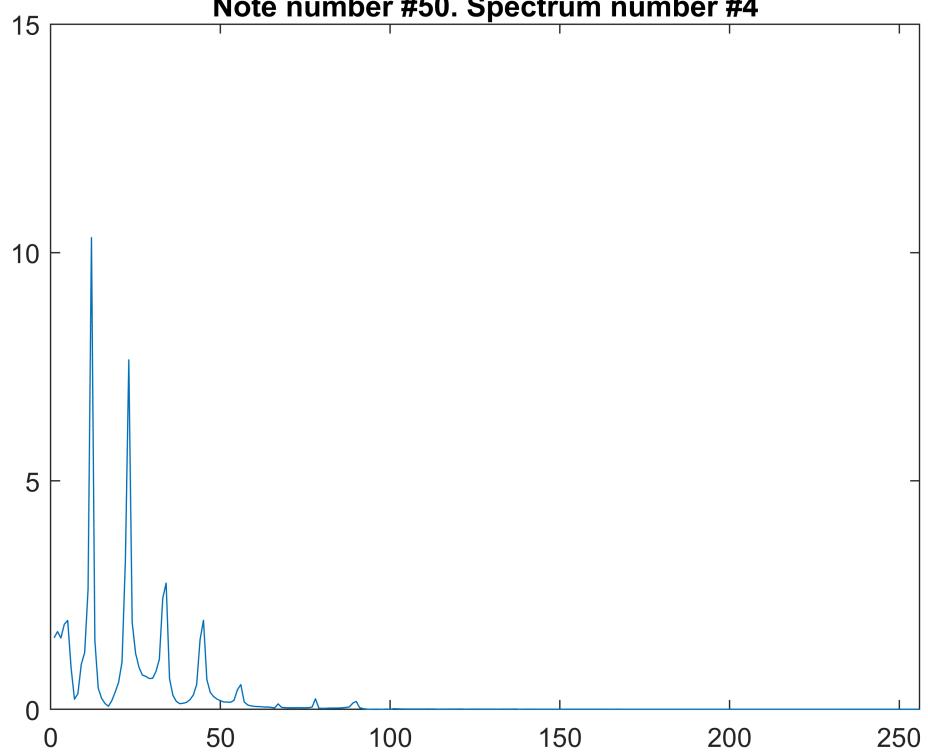
**Note number #50. Spectrum number #2**



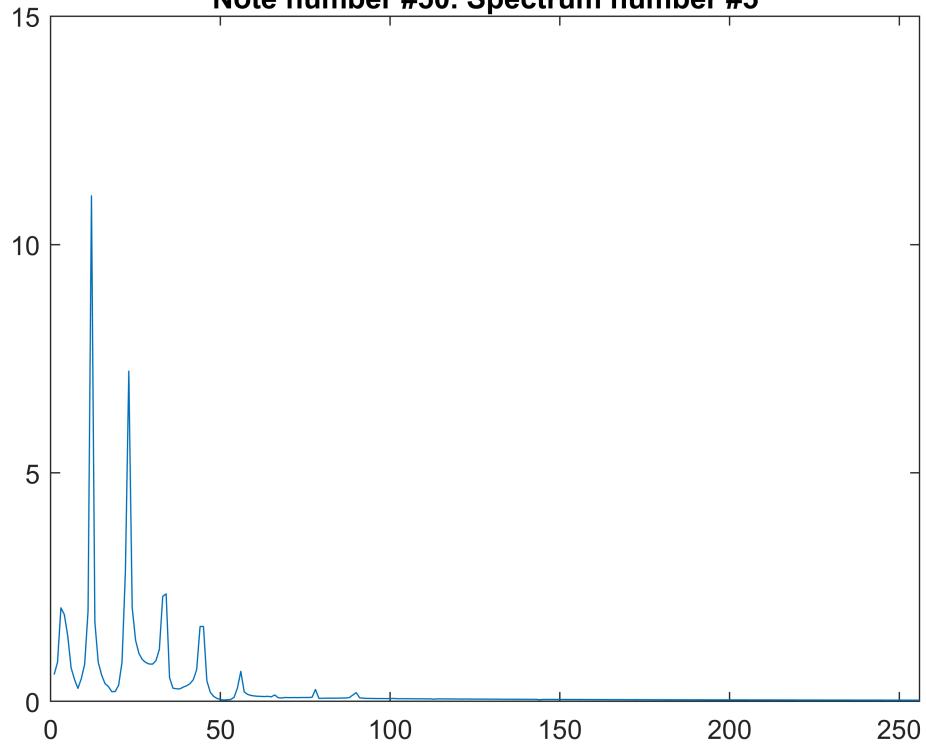
**Note number #50. Spectrum number #3**



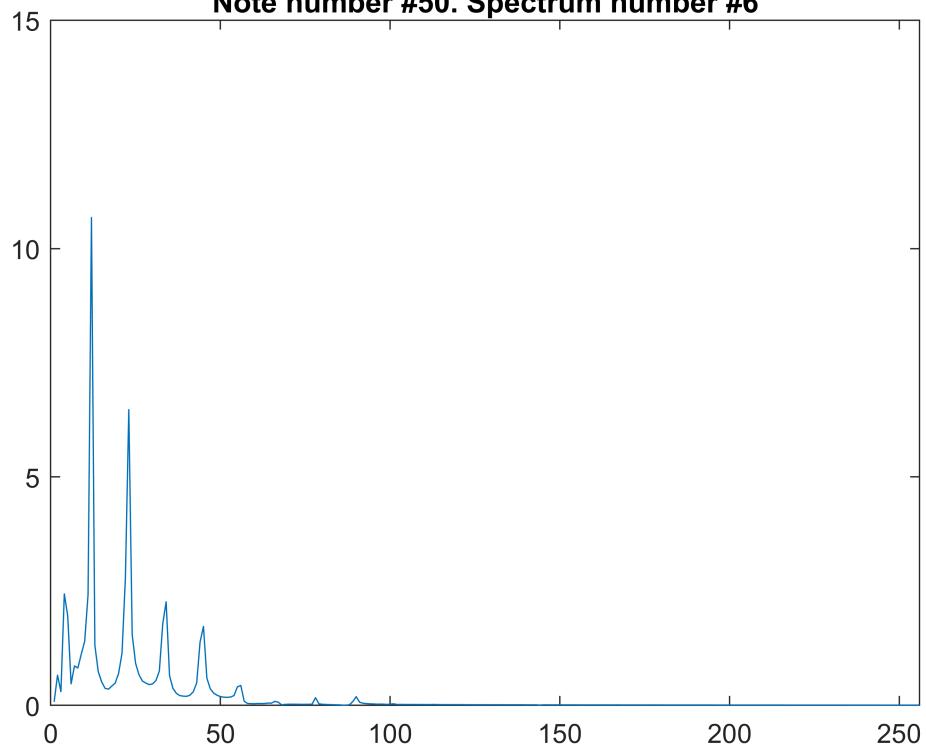
**Note number #50. Spectrum number #4**



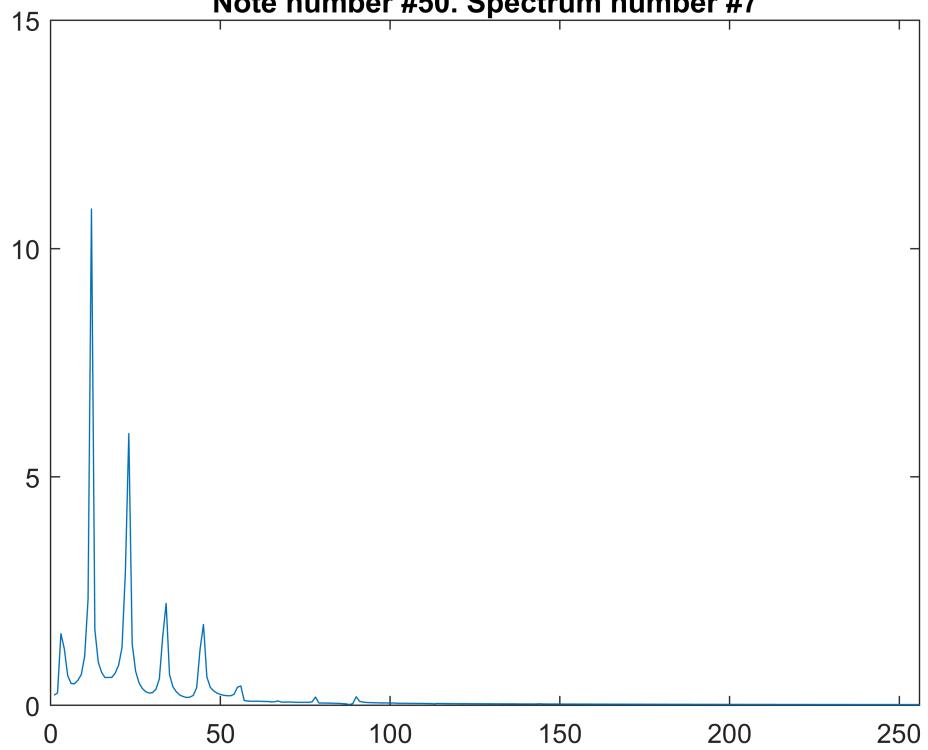
**Note number #50. Spectrum number #5**



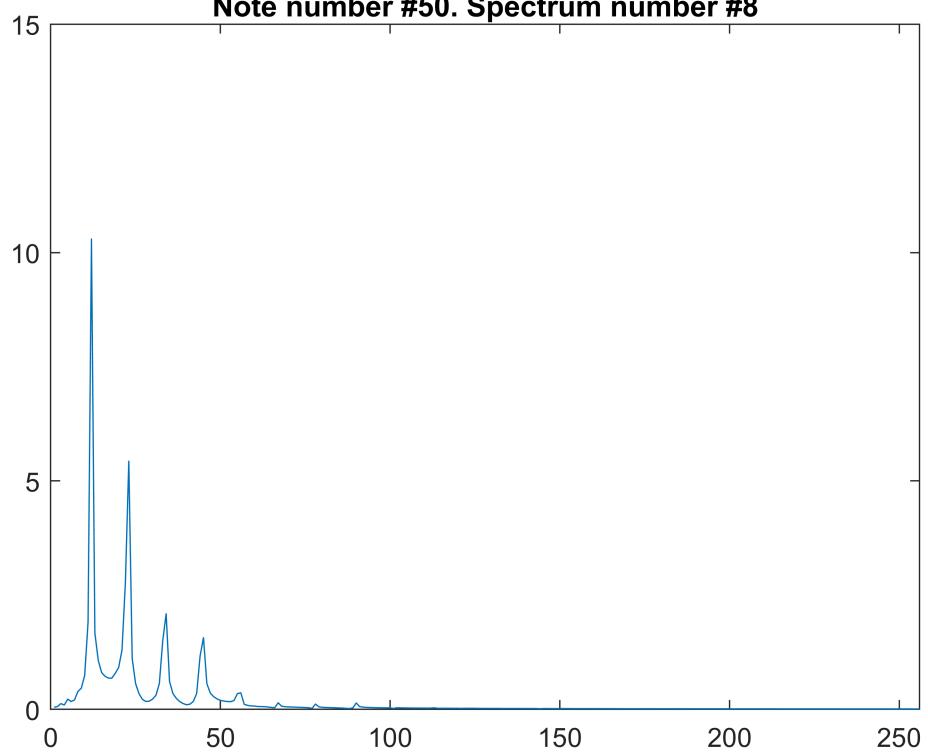
**Note number #50. Spectrum number #6**



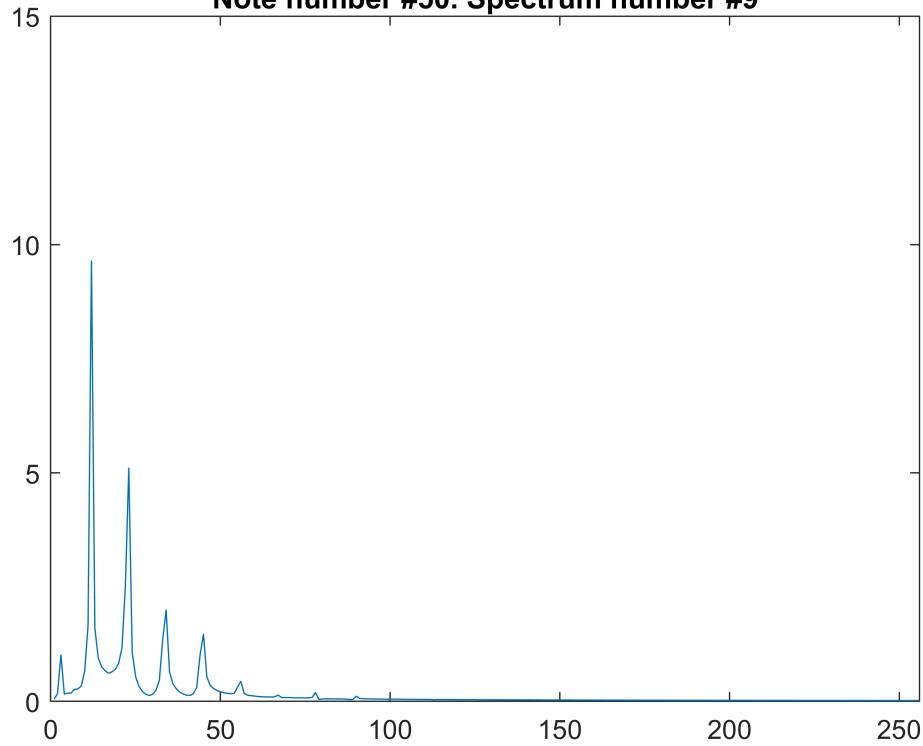
**Note number #50. Spectrum number #7**



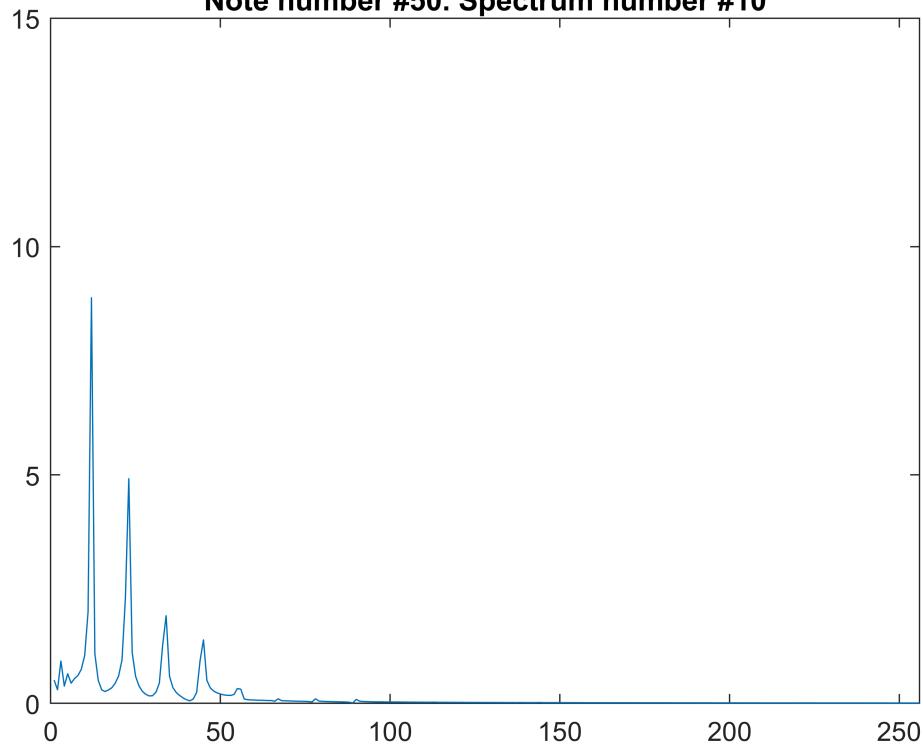
**Note number #50. Spectrum number #8**



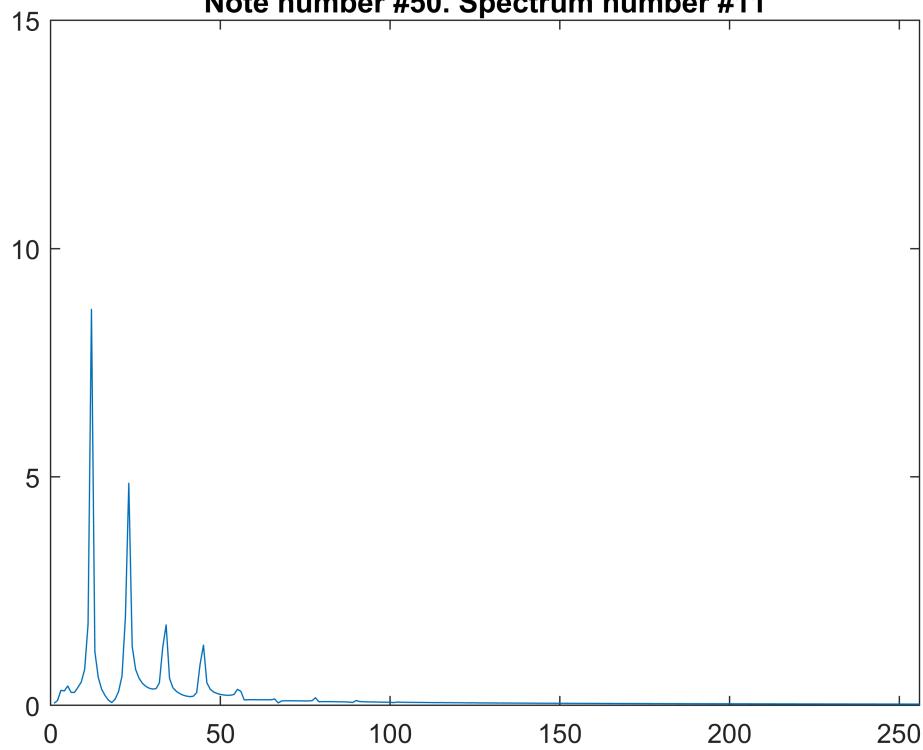
**Note number #50. Spectrum number #9**



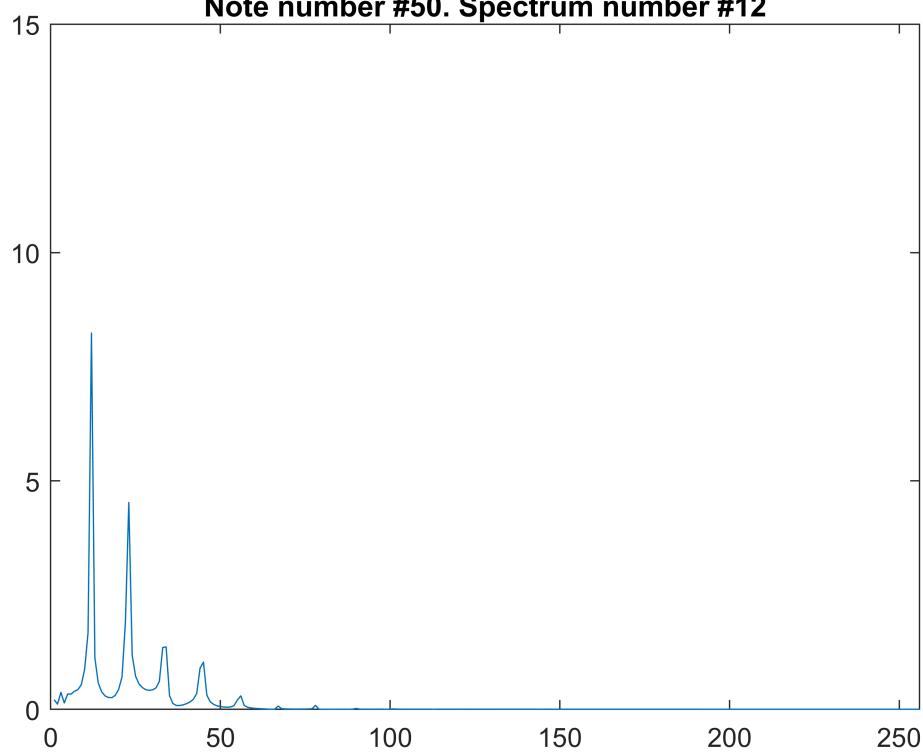
**Note number #50. Spectrum number #10**



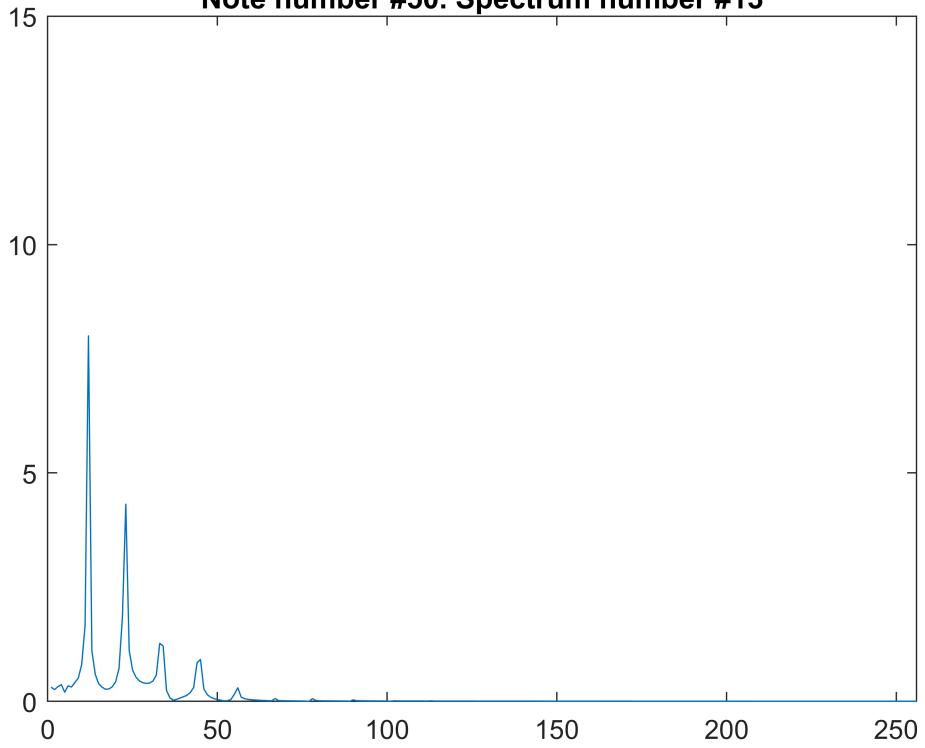
**Note number #50. Spectrum number #11**



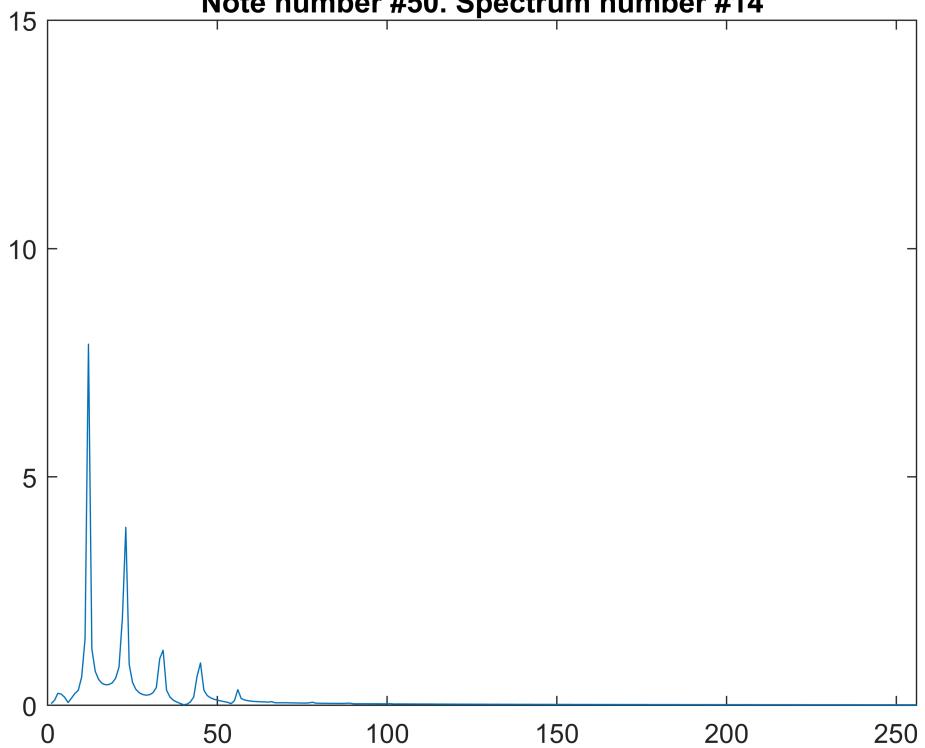
**Note number #50. Spectrum number #12**



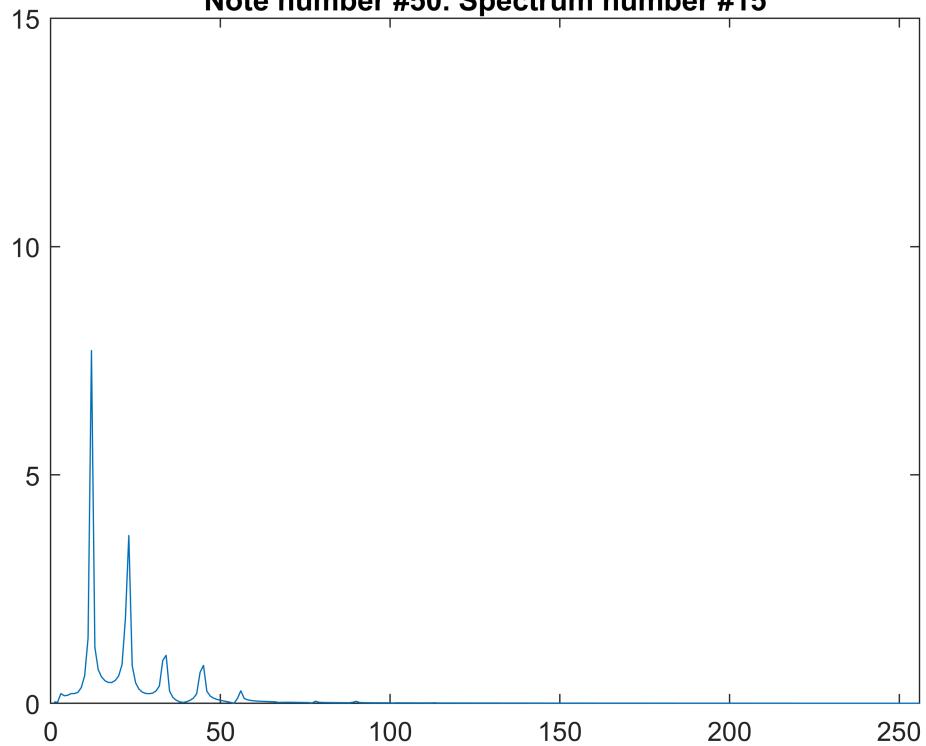
**Note number #50. Spectrum number #13**



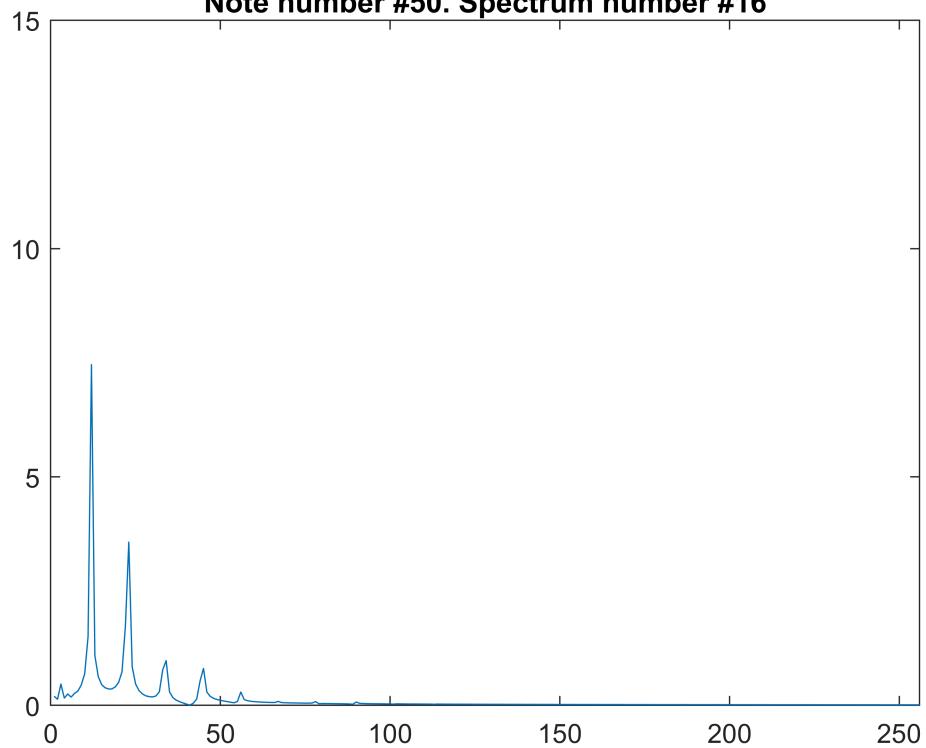
**Note number #50. Spectrum number #14**



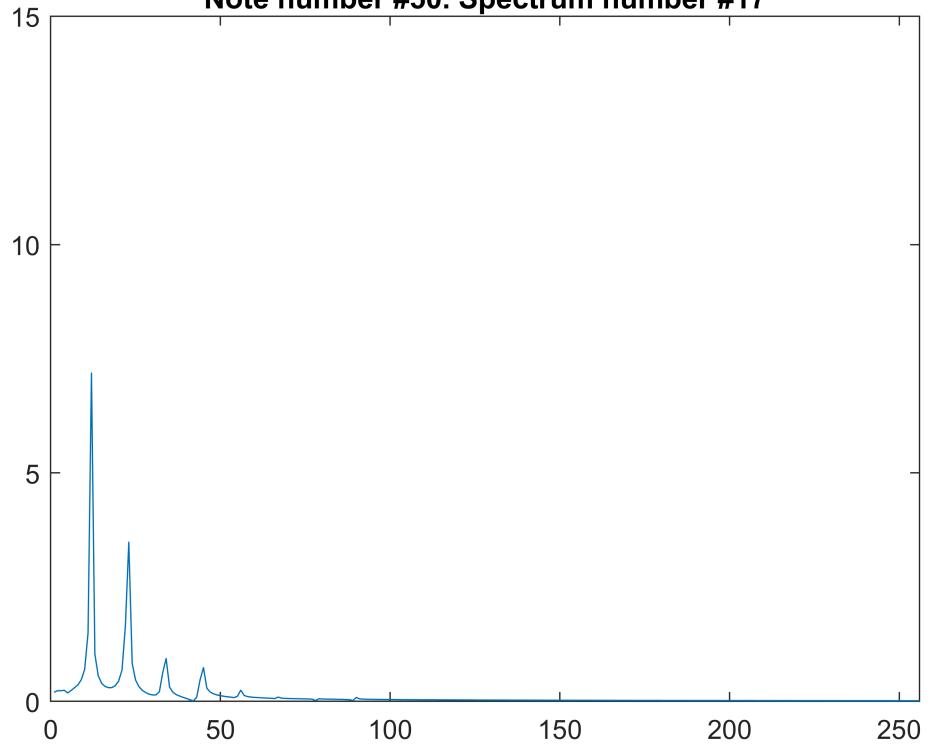
**Note number #50. Spectrum number #15**



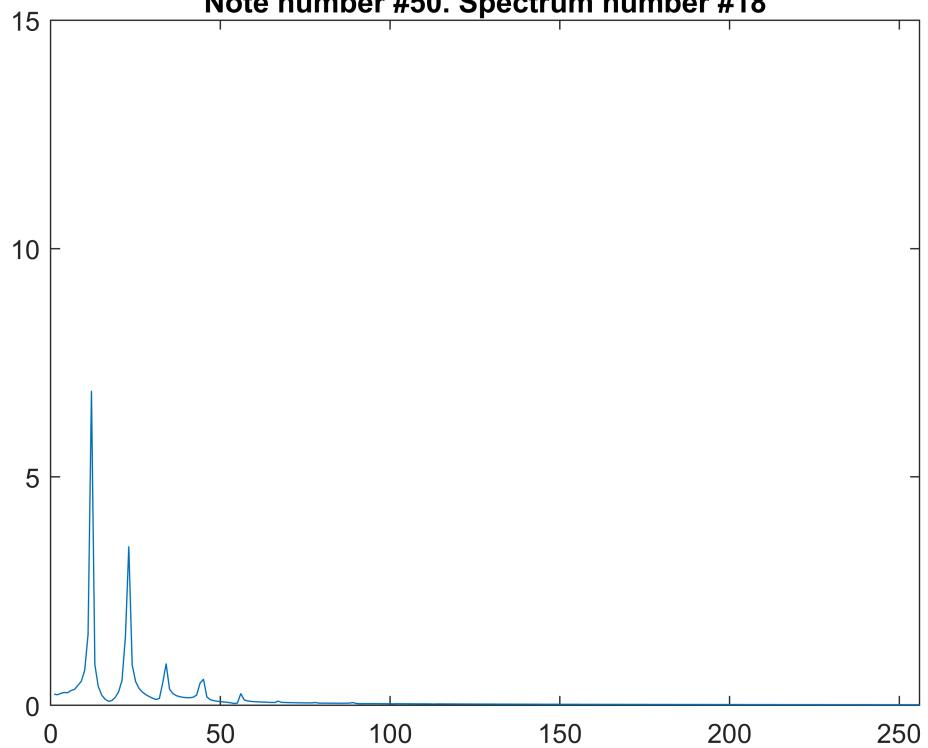
**Note number #50. Spectrum number #16**



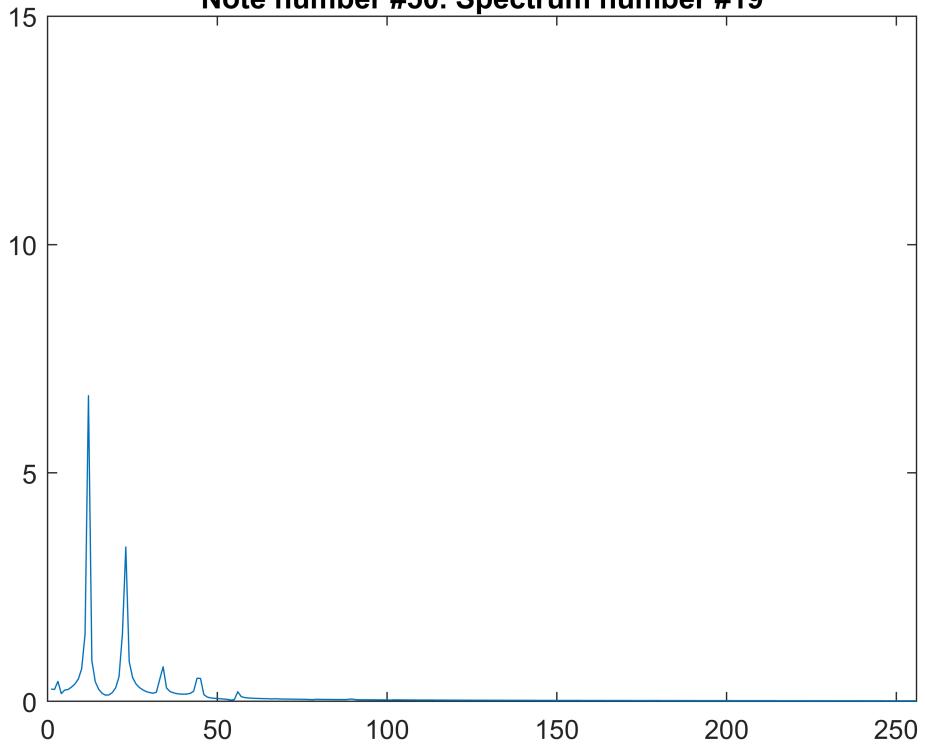
**Note number #50. Spectrum number #17**



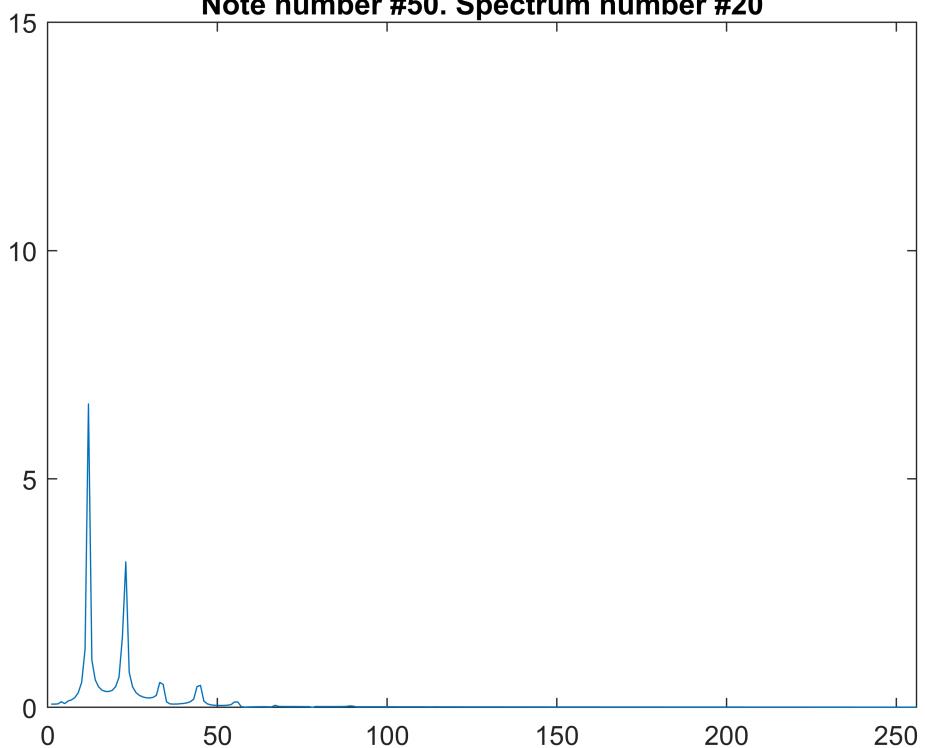
**Note number #50. Spectrum number #18**



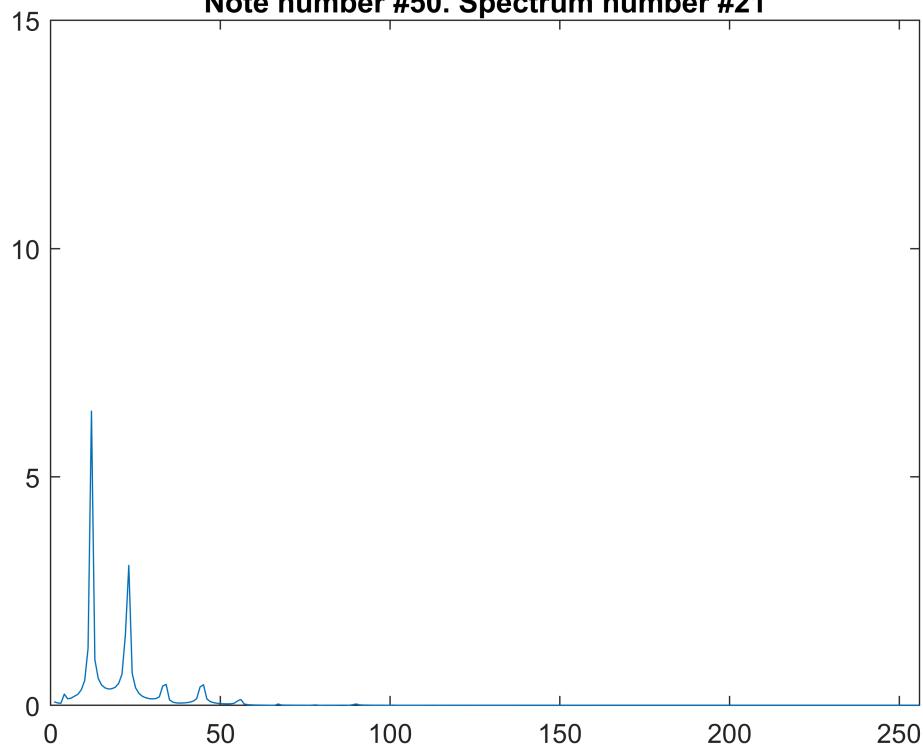
**Note number #50. Spectrum number #19**



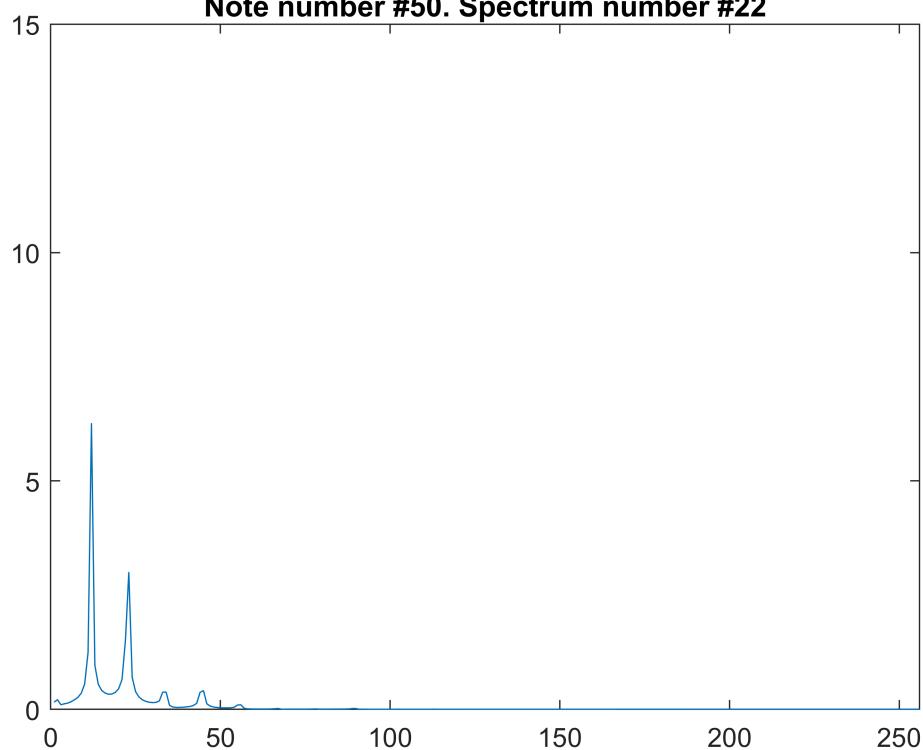
**Note number #50. Spectrum number #20**



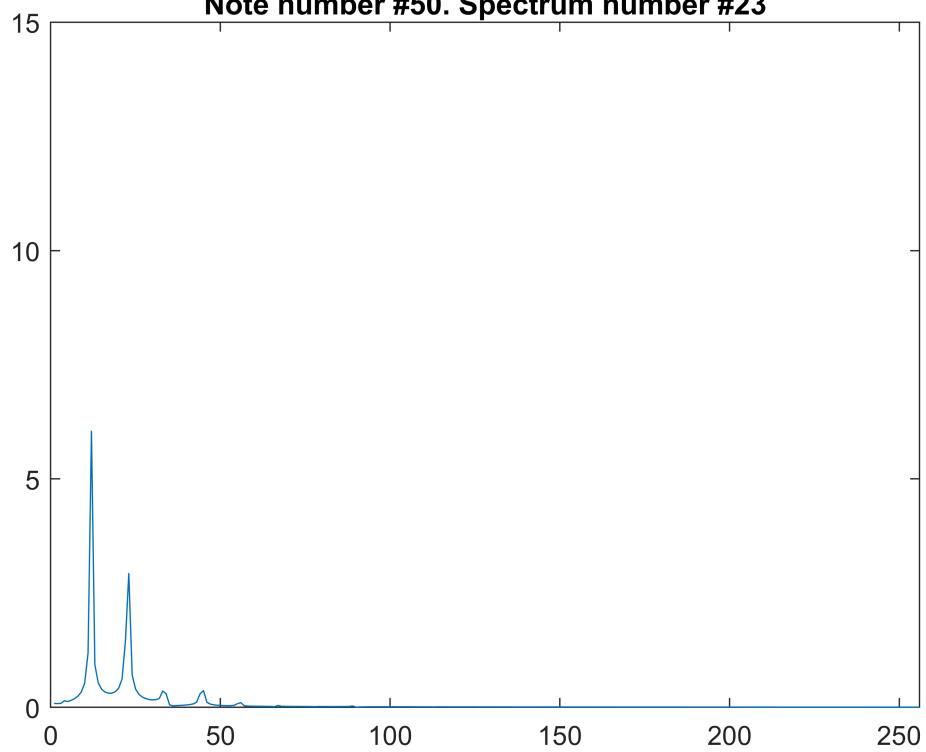
**Note number #50. Spectrum number #21**



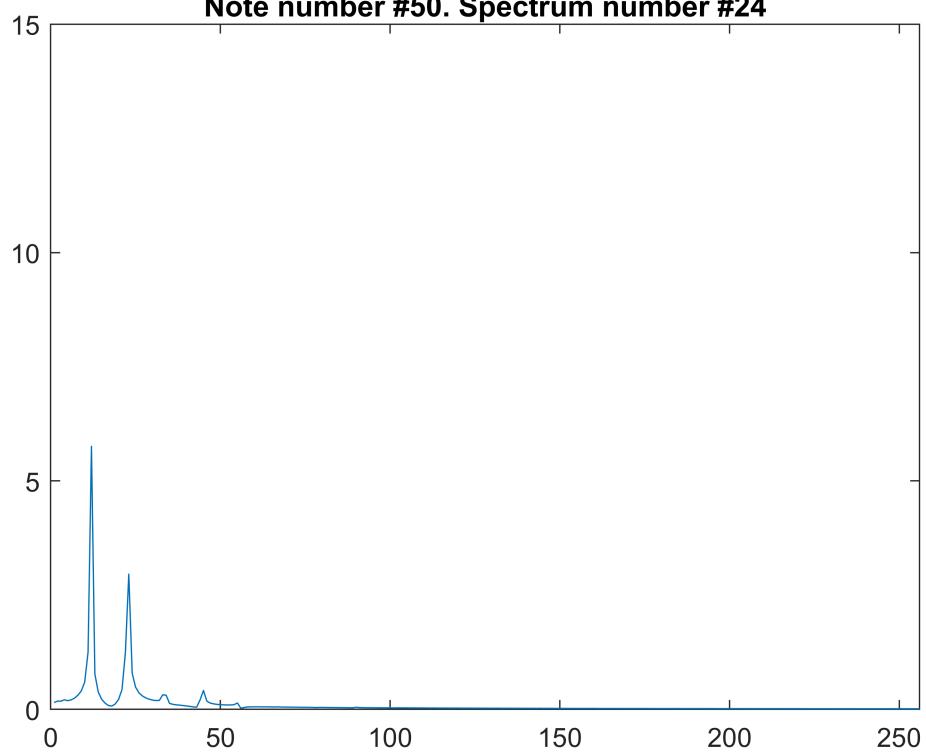
**Note number #50. Spectrum number #22**



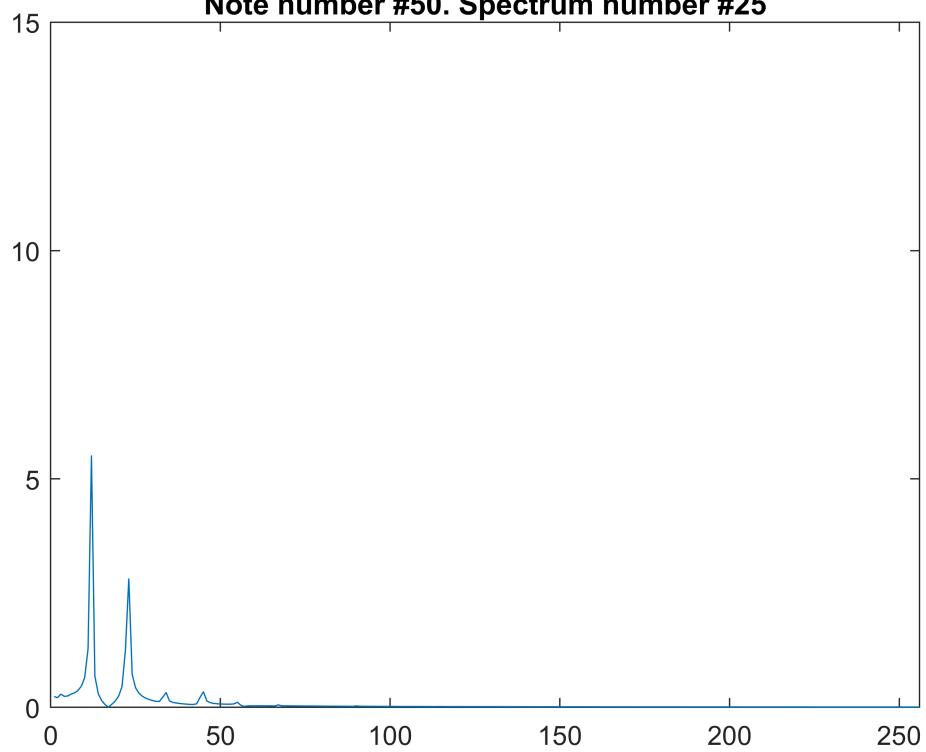
**Note number #50. Spectrum number #23**



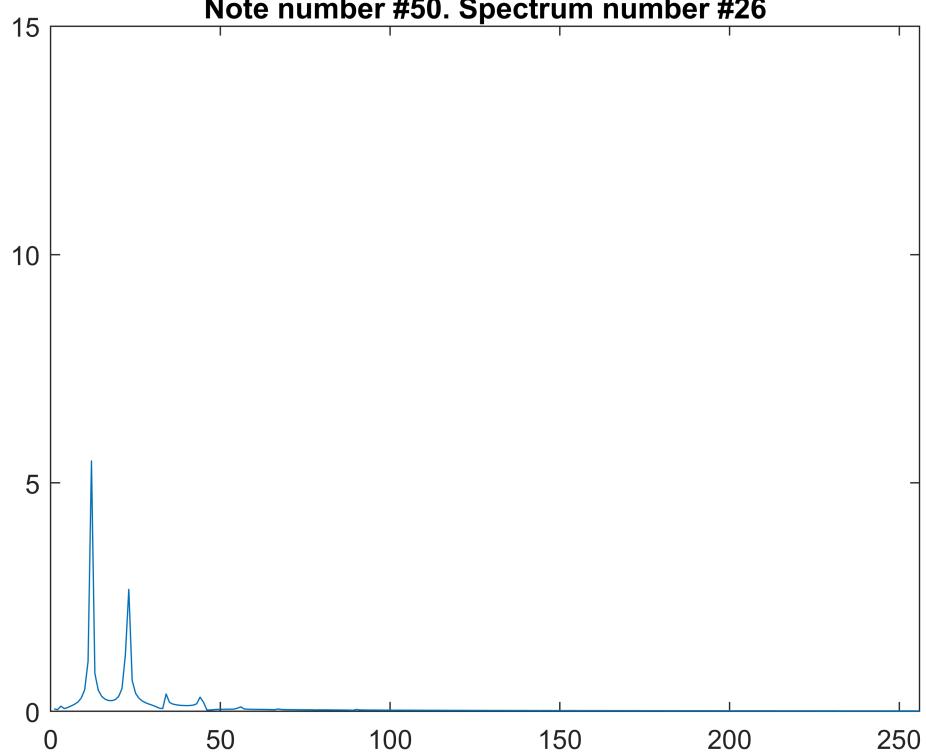
**Note number #50. Spectrum number #24**



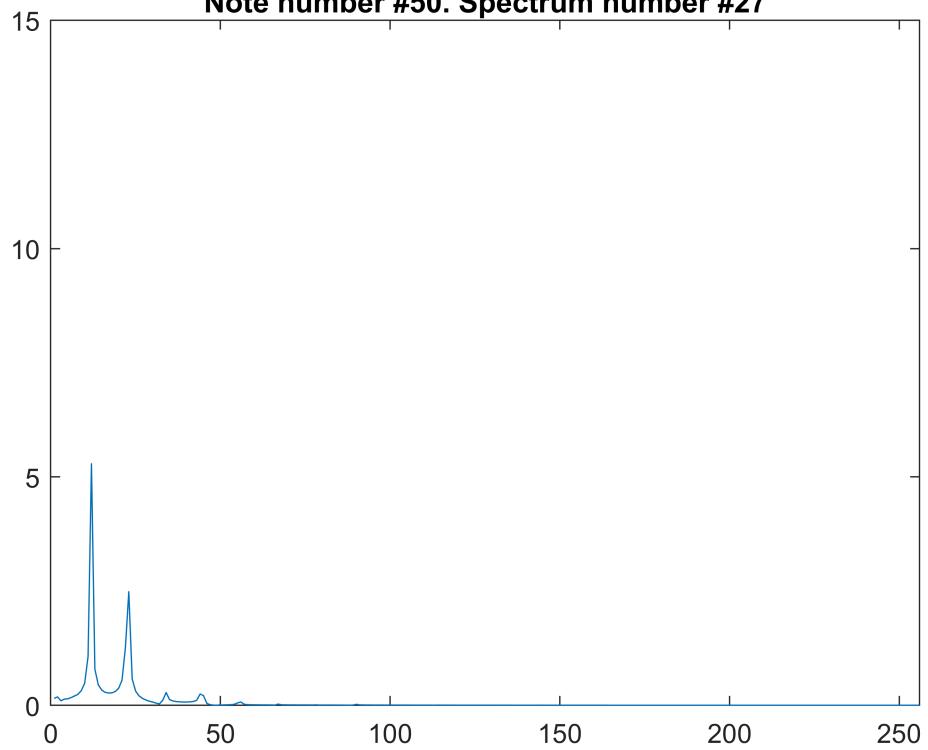
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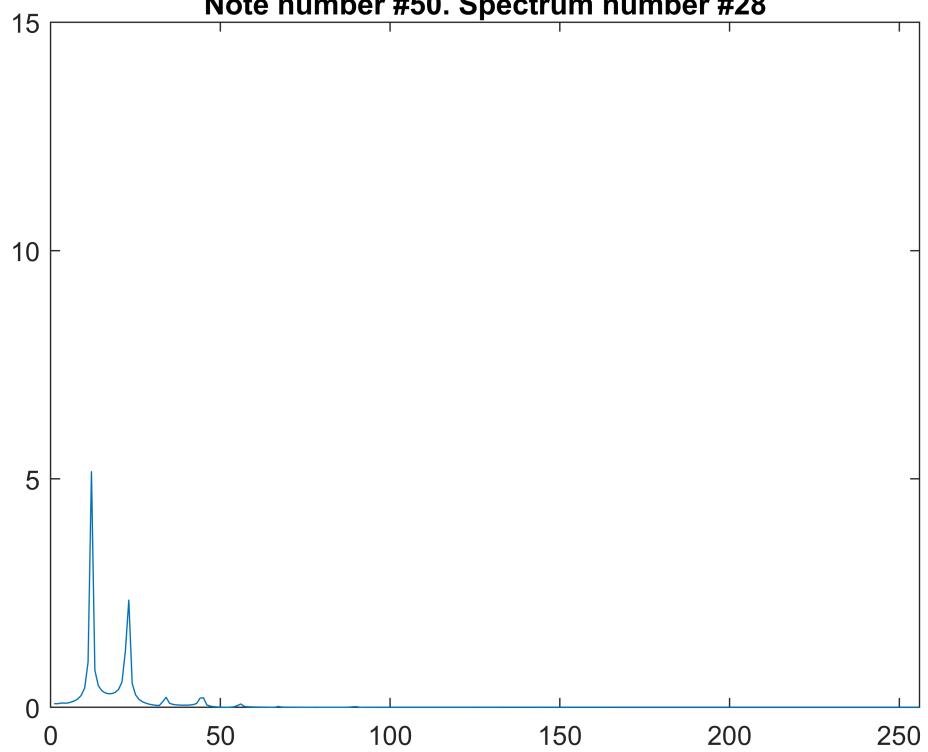
**Note number #50. Spectrum number #26**

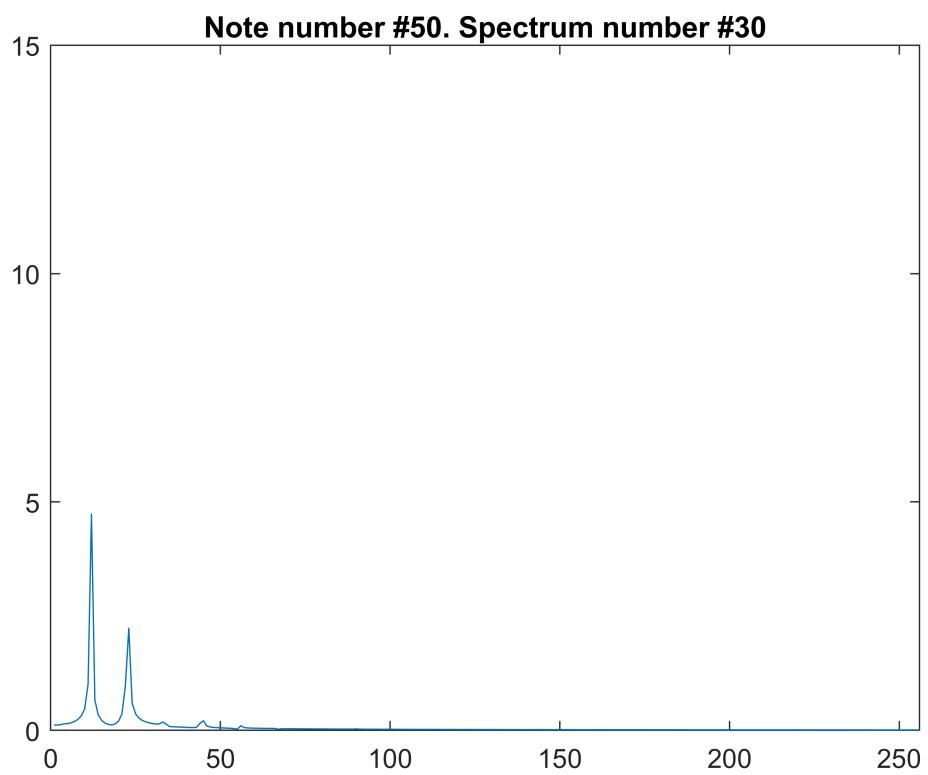
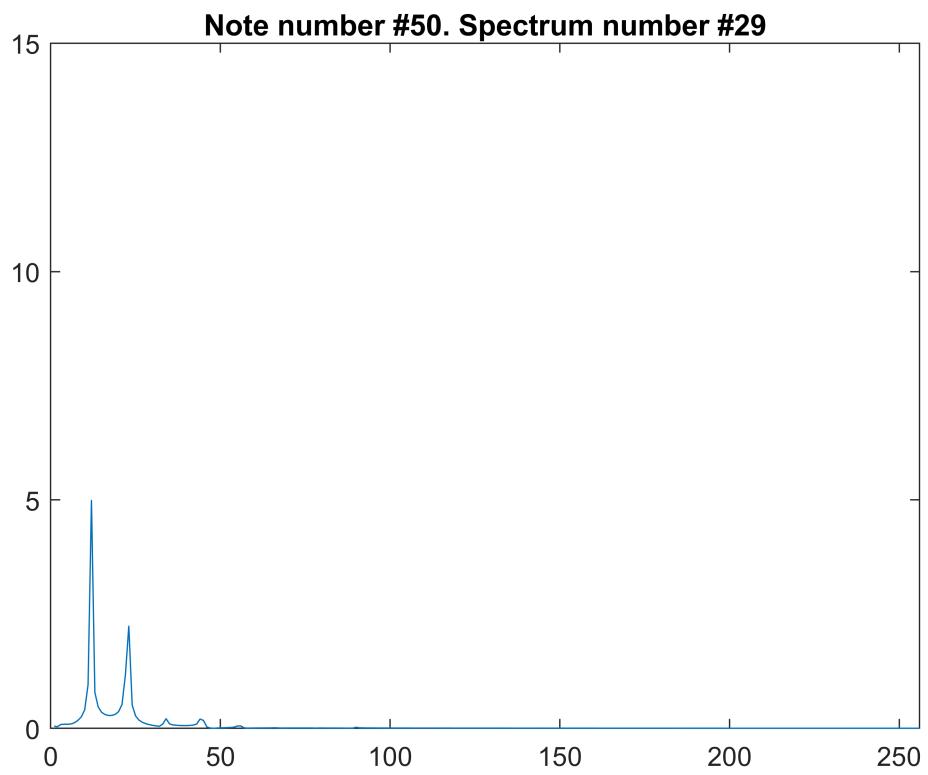


**Note number #50. Spectrum number #27**

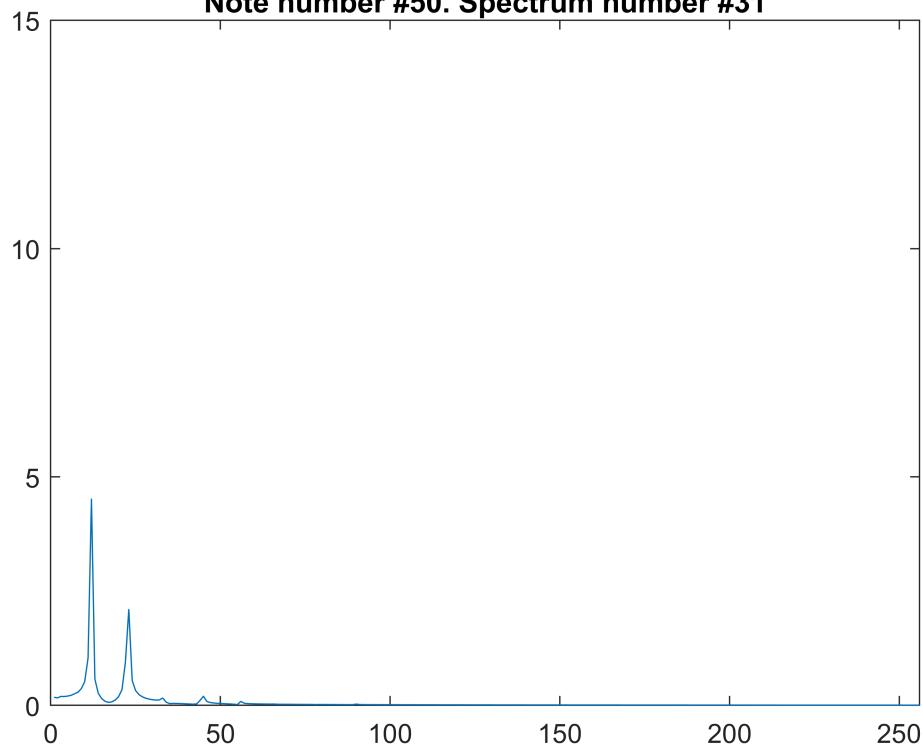


**Note number #50. Spectrum number #28**

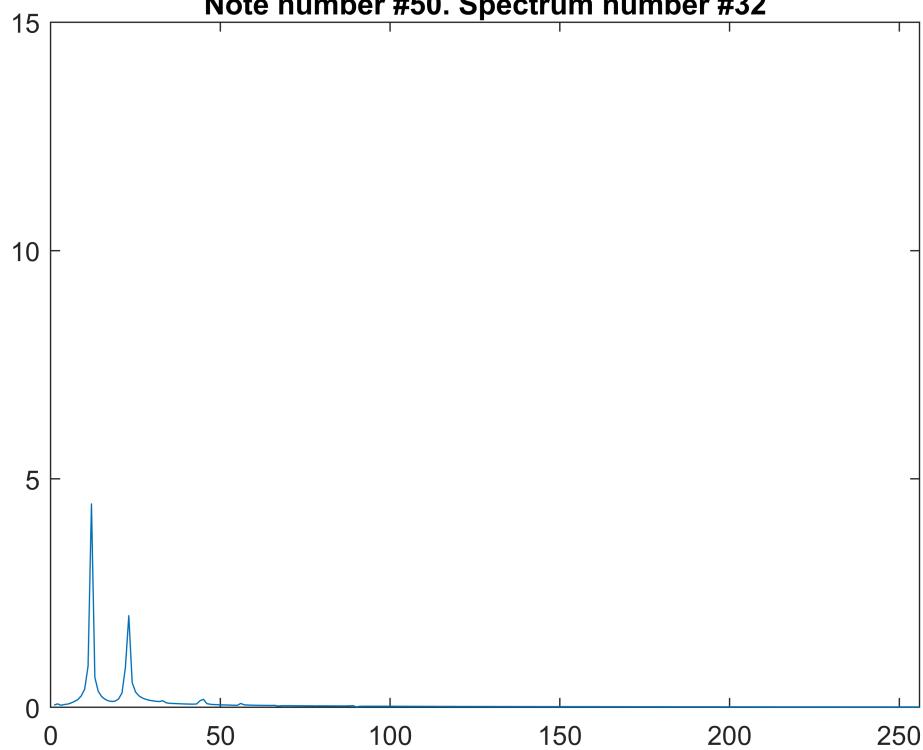


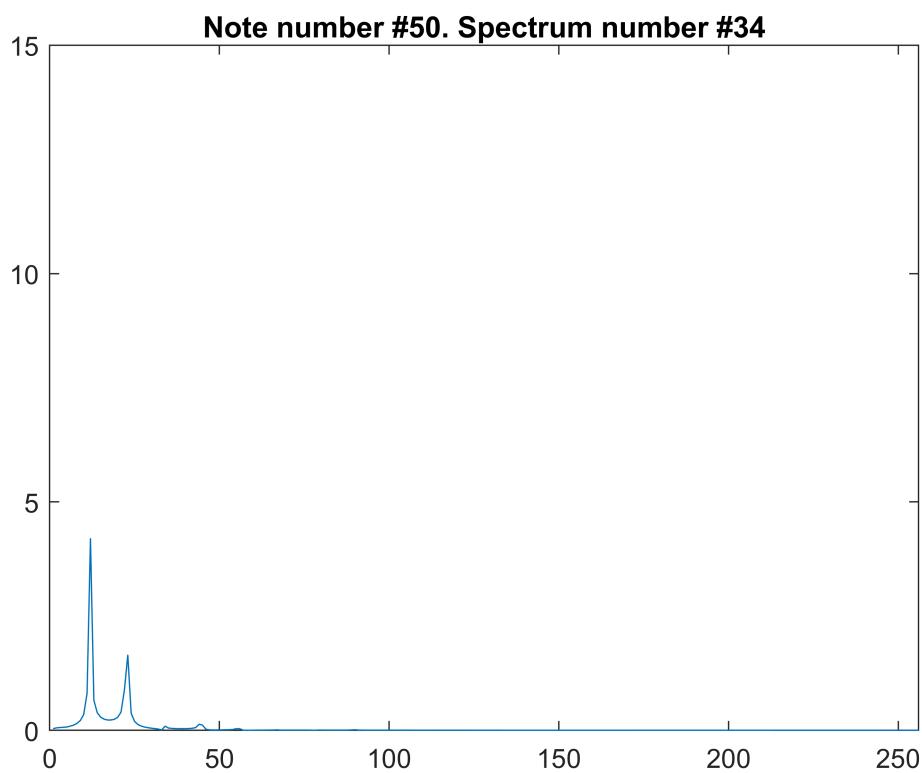
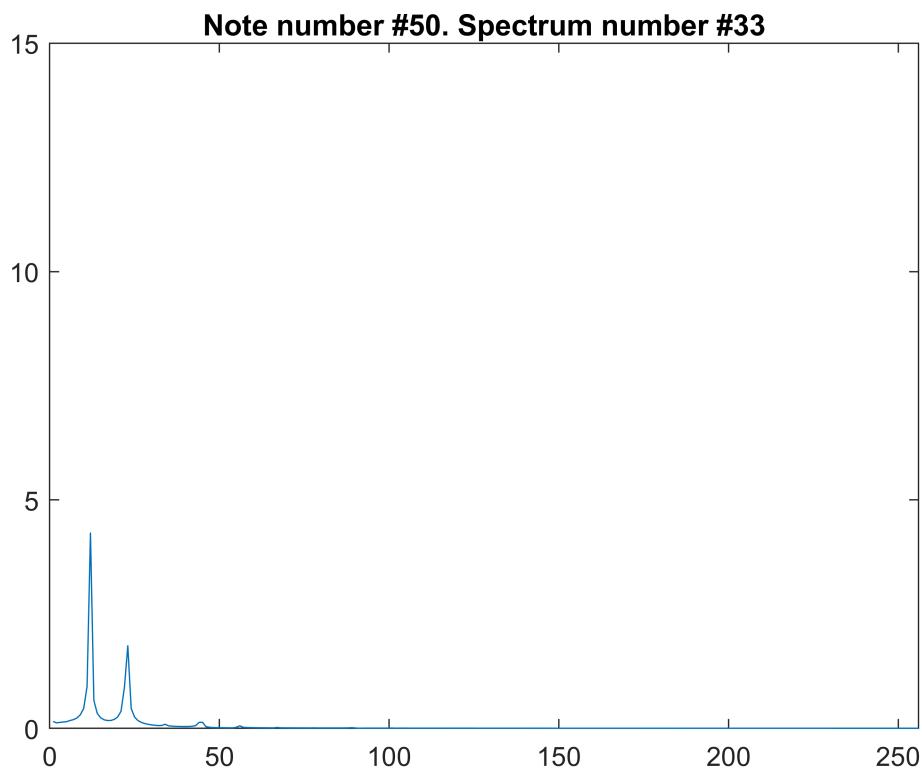


**Note number #50. Spectrum number #31**

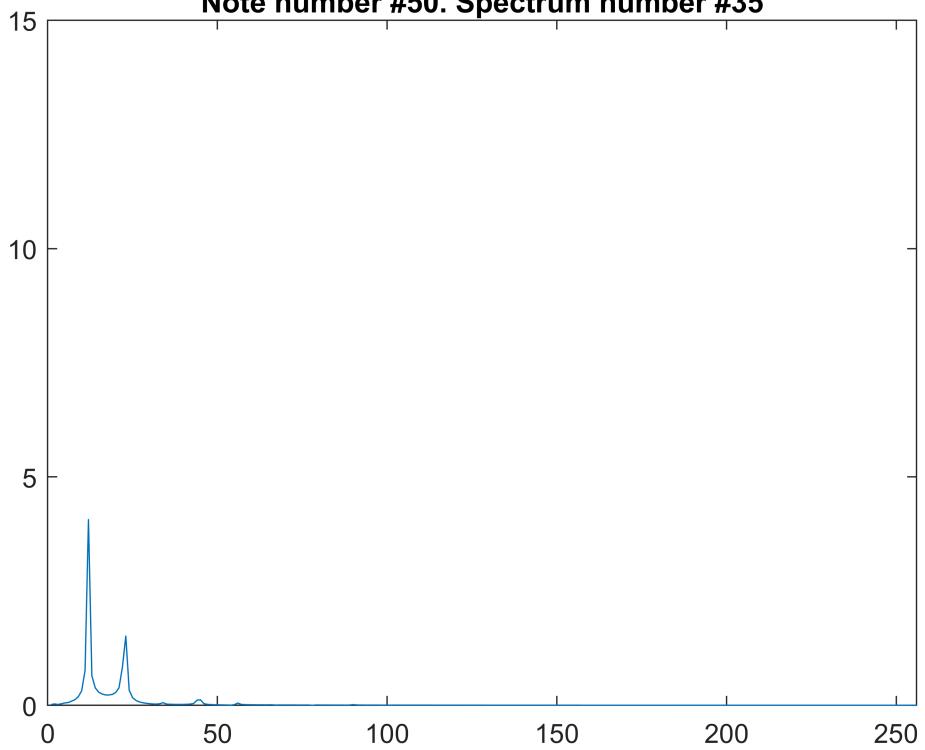


**Note number #50. Spectrum number #32**

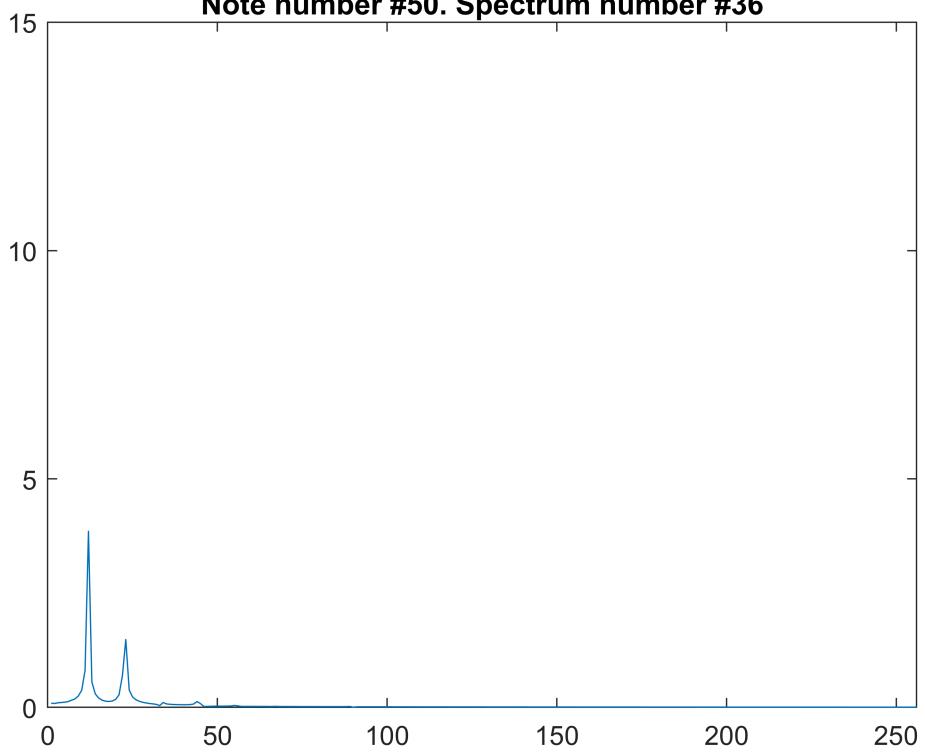




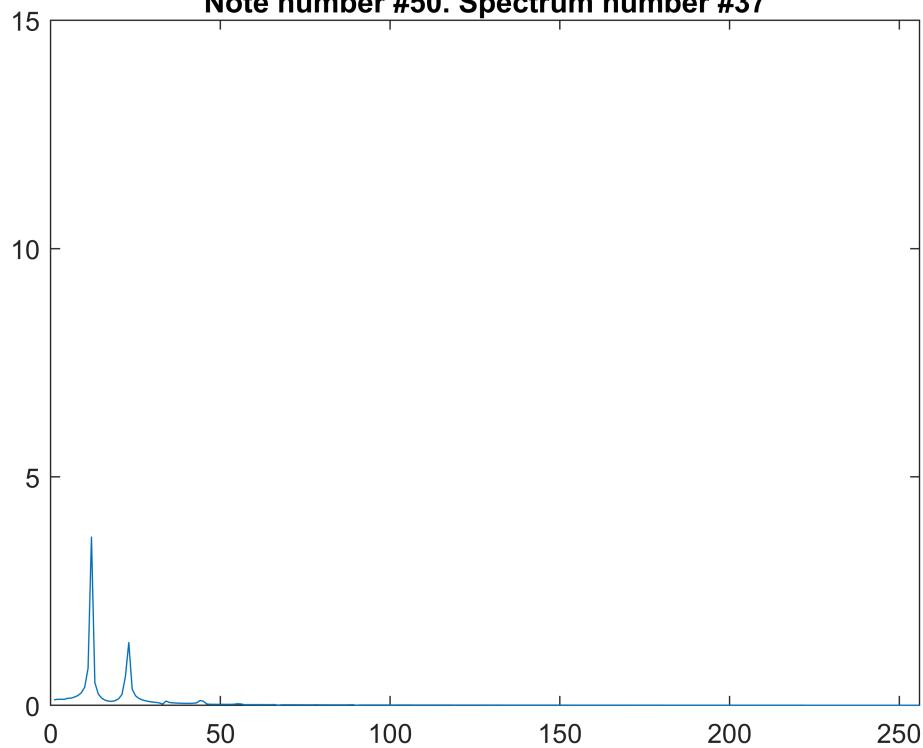
**Note number #50. Spectrum number #35**



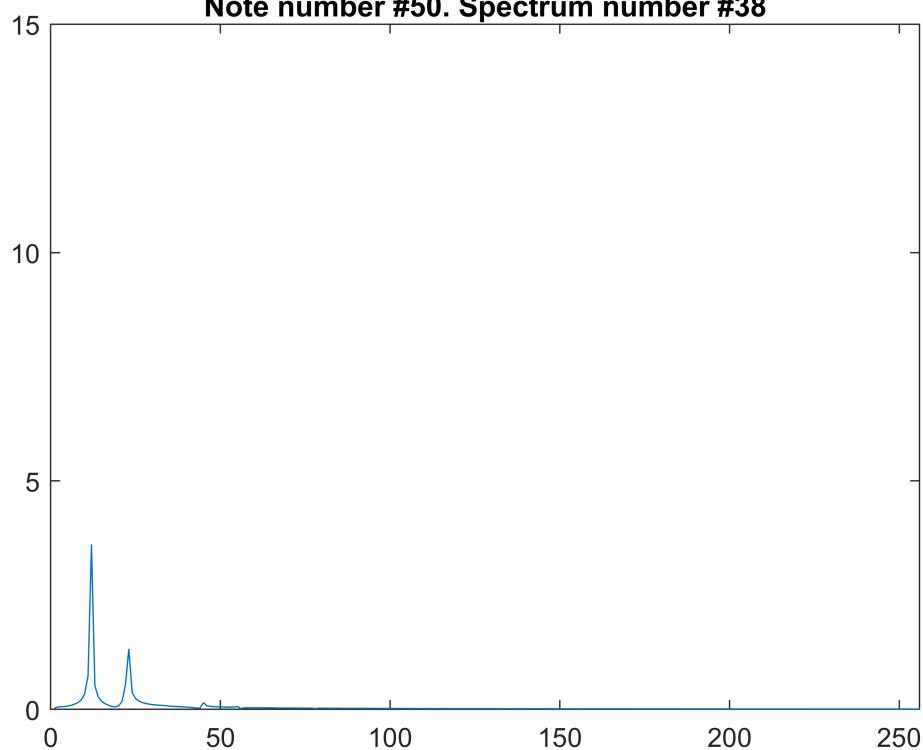
**Note number #50. Spectrum number #36**



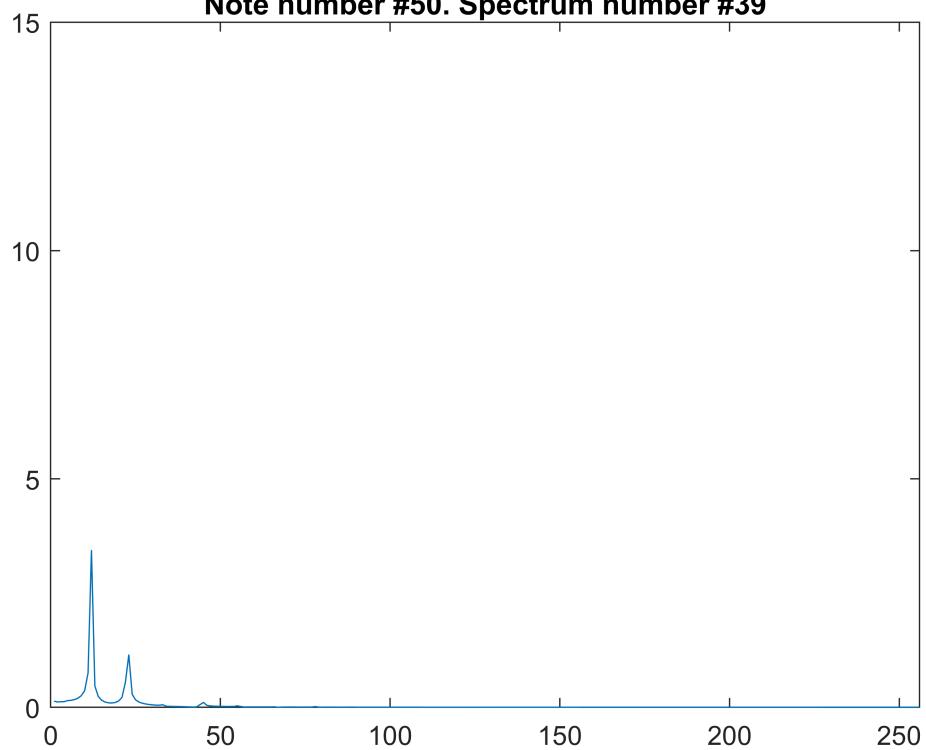
**Note number #50. Spectrum number #37**



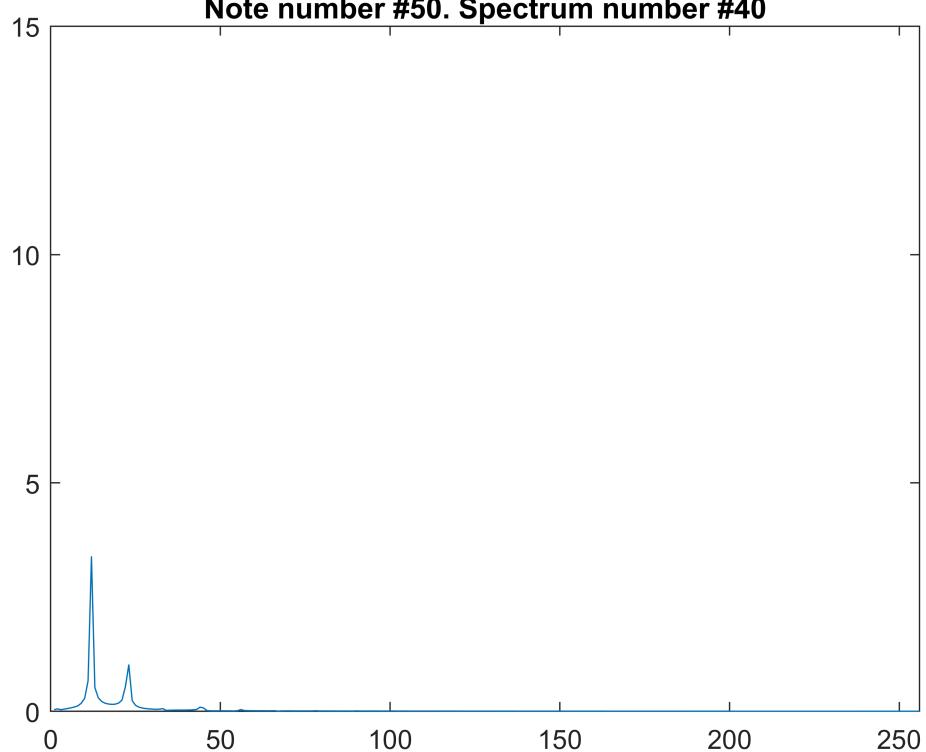
**Note number #50. Spectrum number #38**



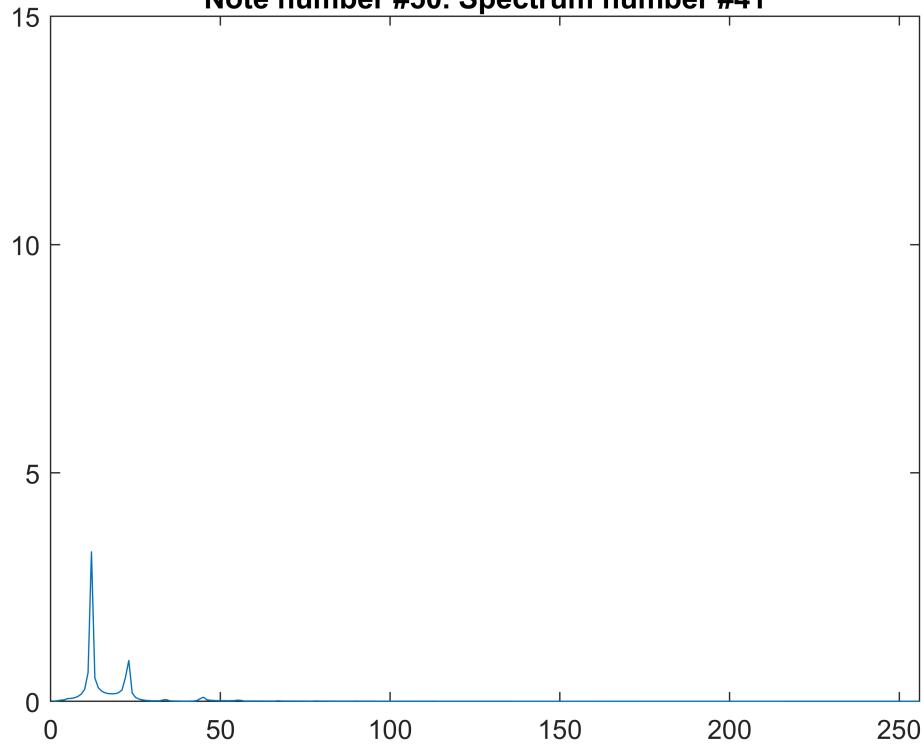
**Note number #50. Spectrum number #39**



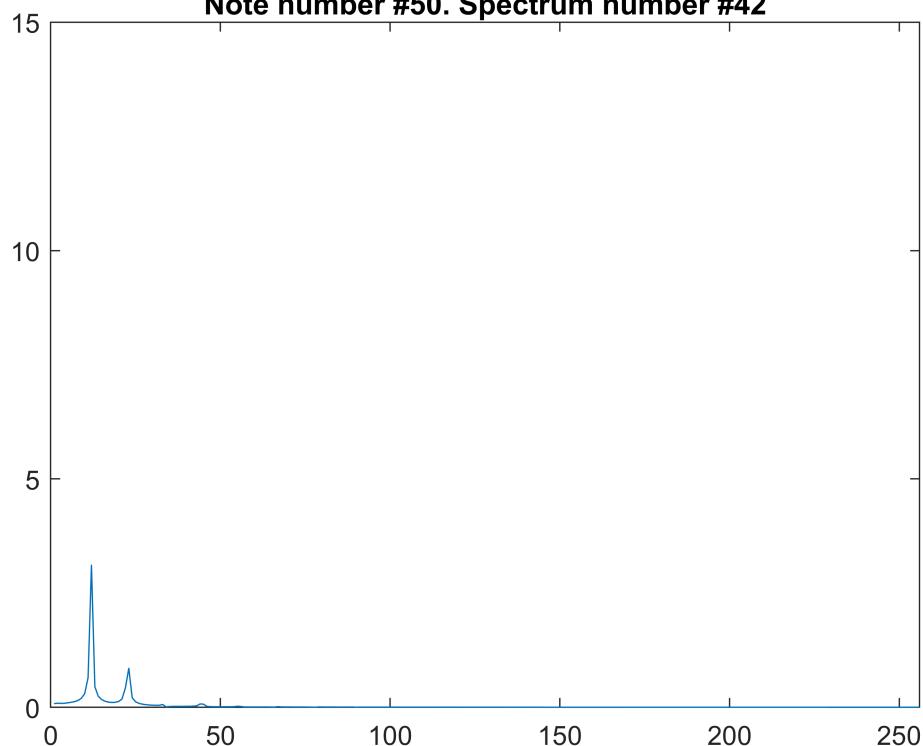
**Note number #50. Spectrum number #40**



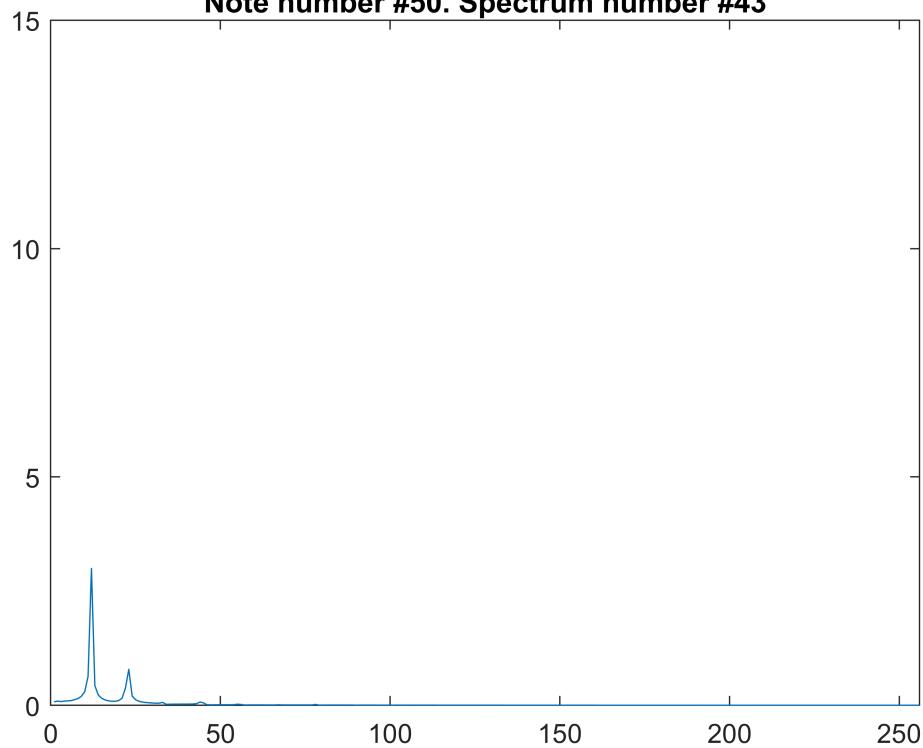
**Note number #50. Spectrum number #41**



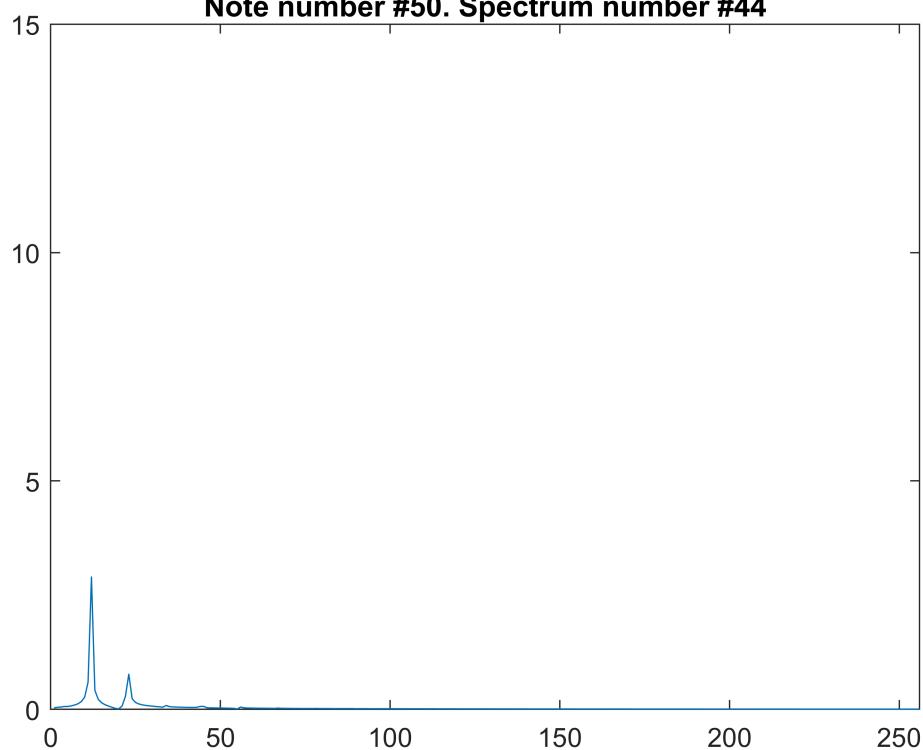
**Note number #50. Spectrum number #42**



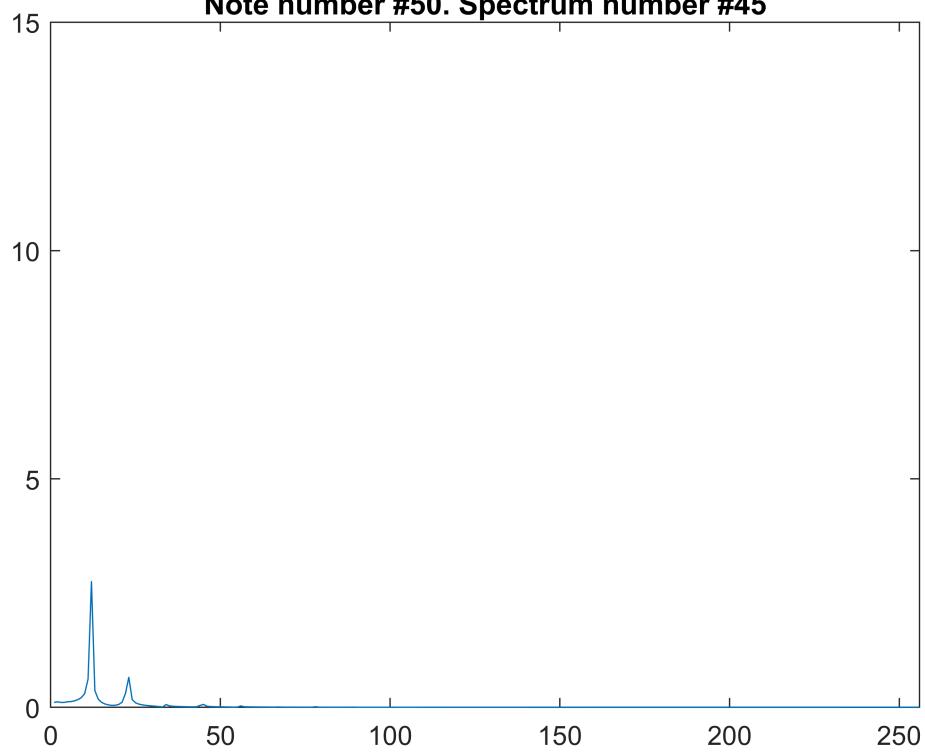
**Note number #50. Spectrum number #43**



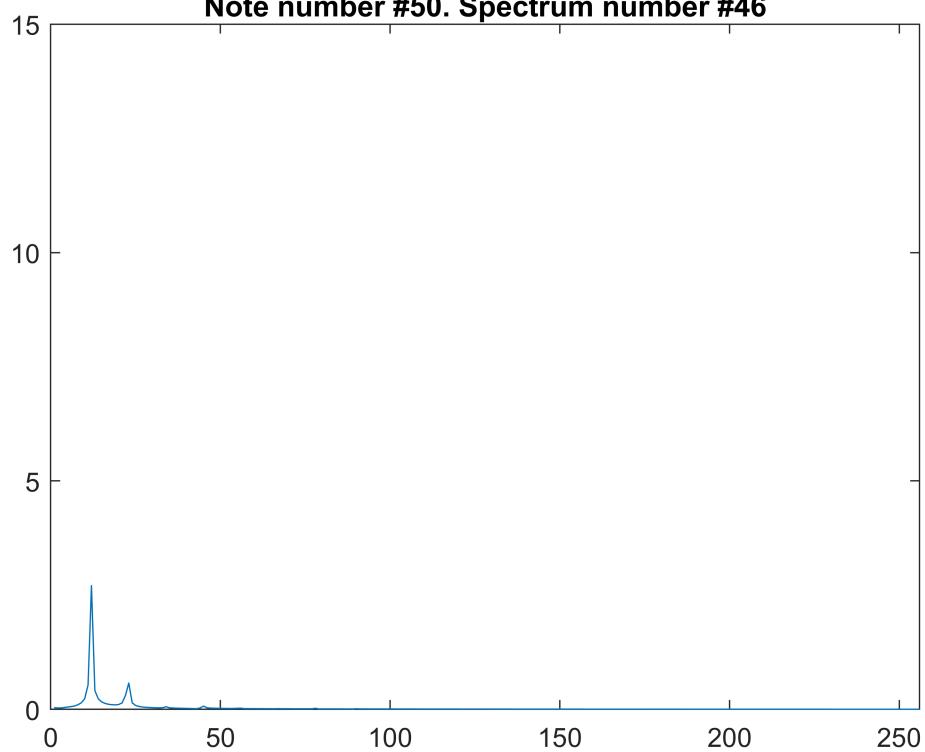
**Note number #50. Spectrum number #44**



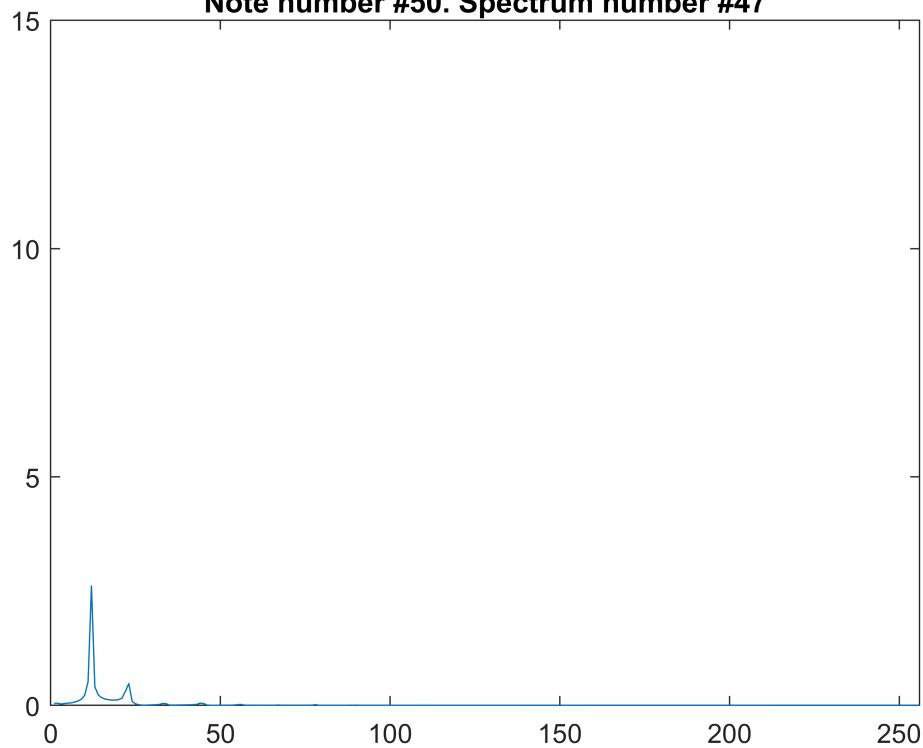
**Note number #50. Spectrum number #45**



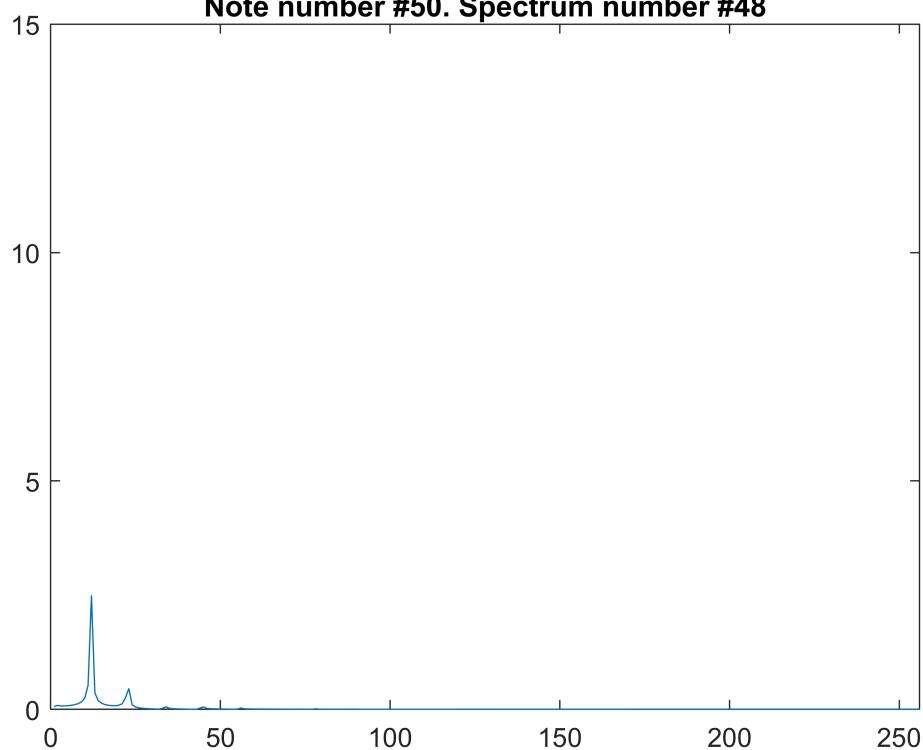
**Note number #50. Spectrum number #46**



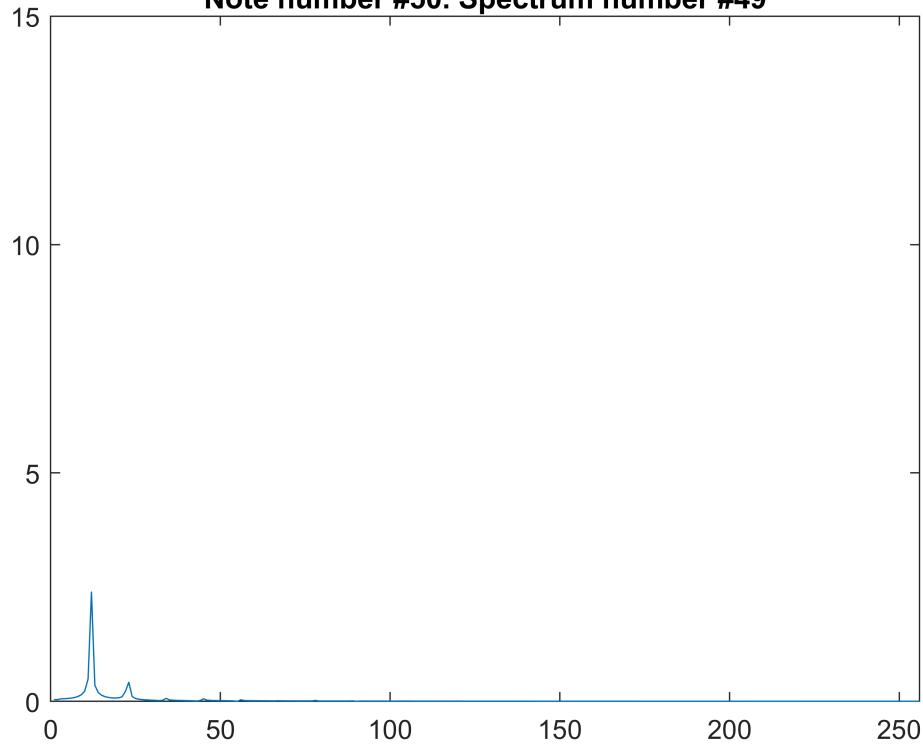
**Note number #50. Spectrum number #47**



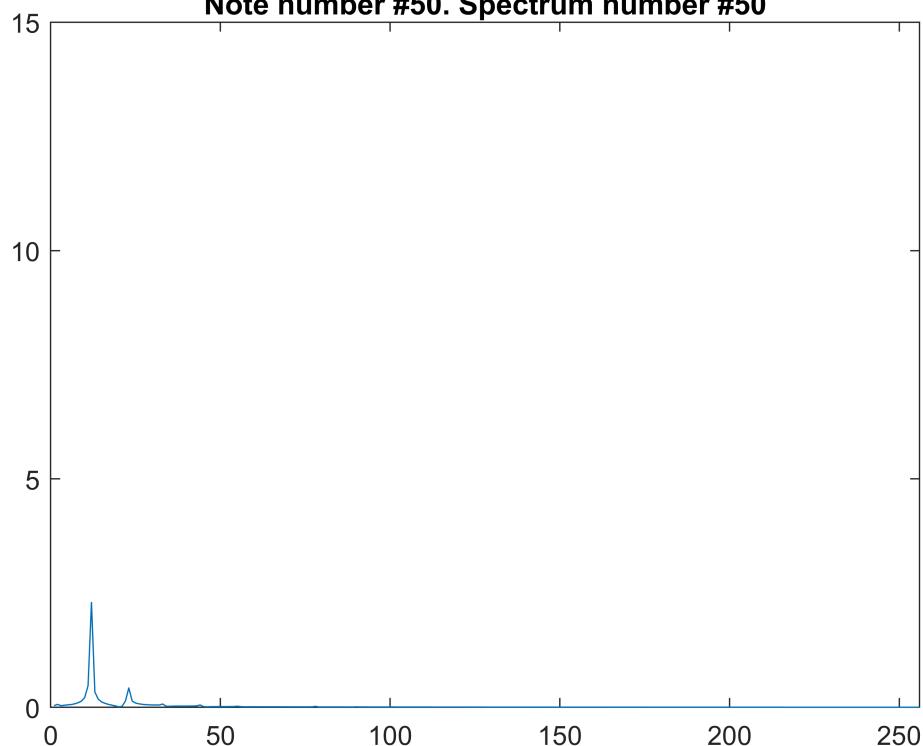
**Note number #50. Spectrum number #48**



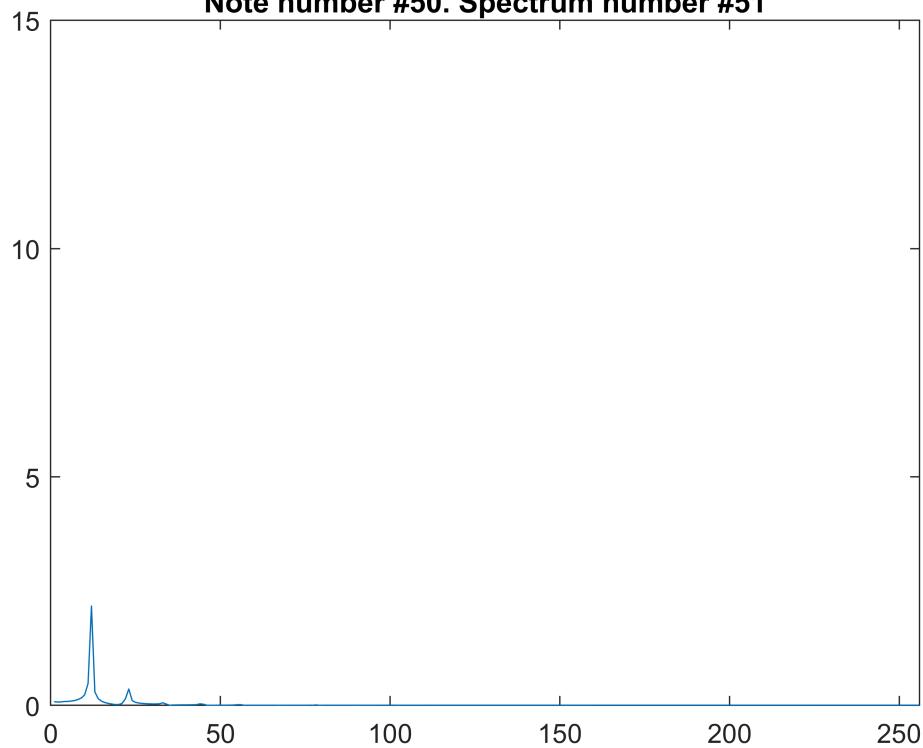
**Note number #50. Spectrum number #49**



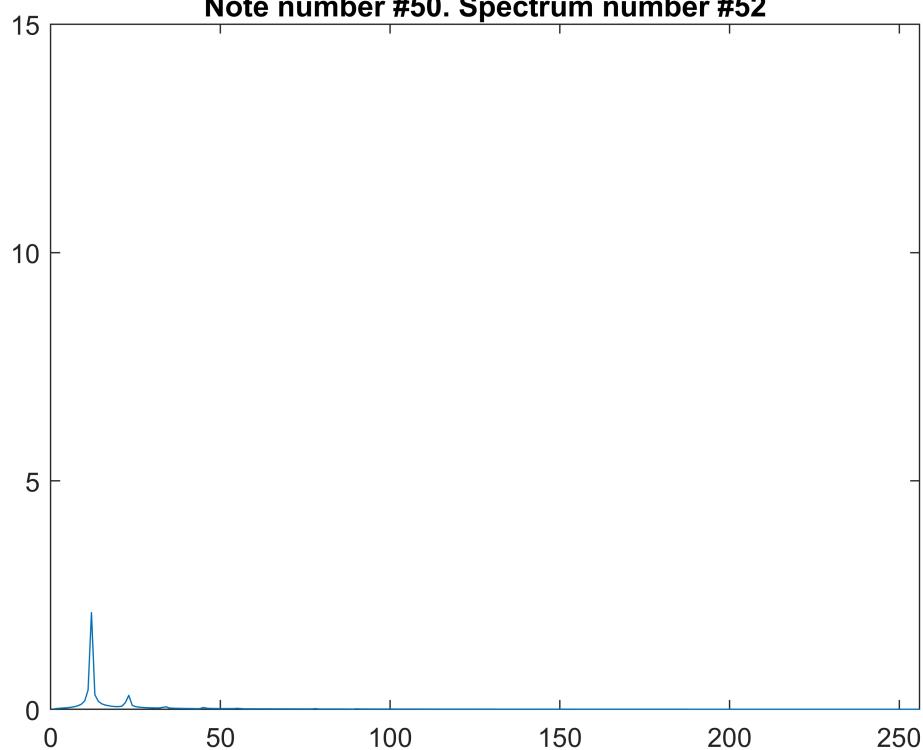
**Note number #50. Spectrum number #50**



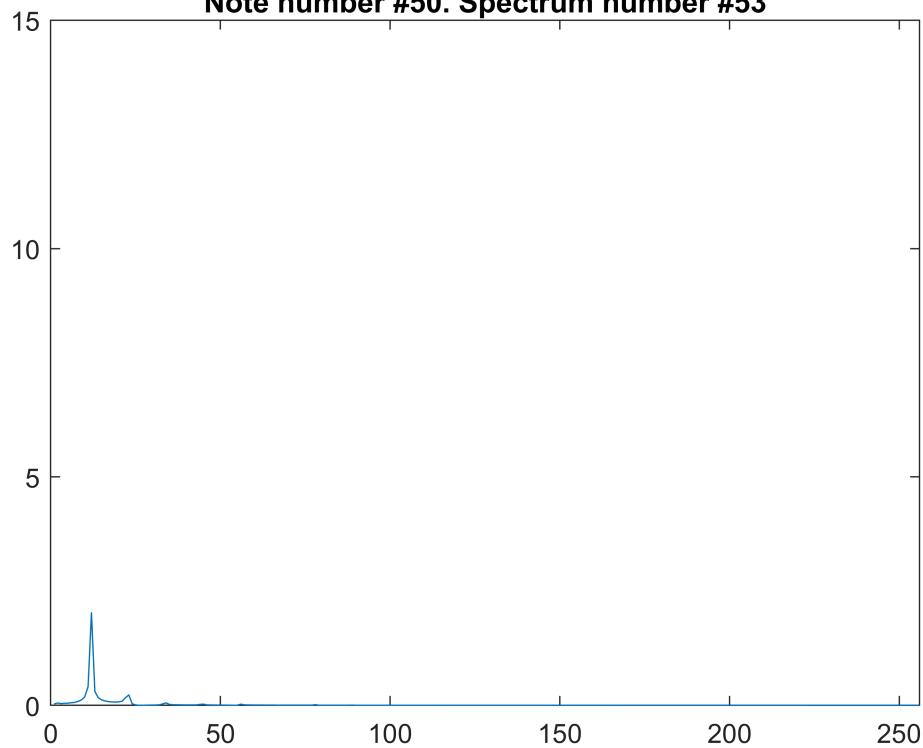
**Note number #50. Spectrum number #51**



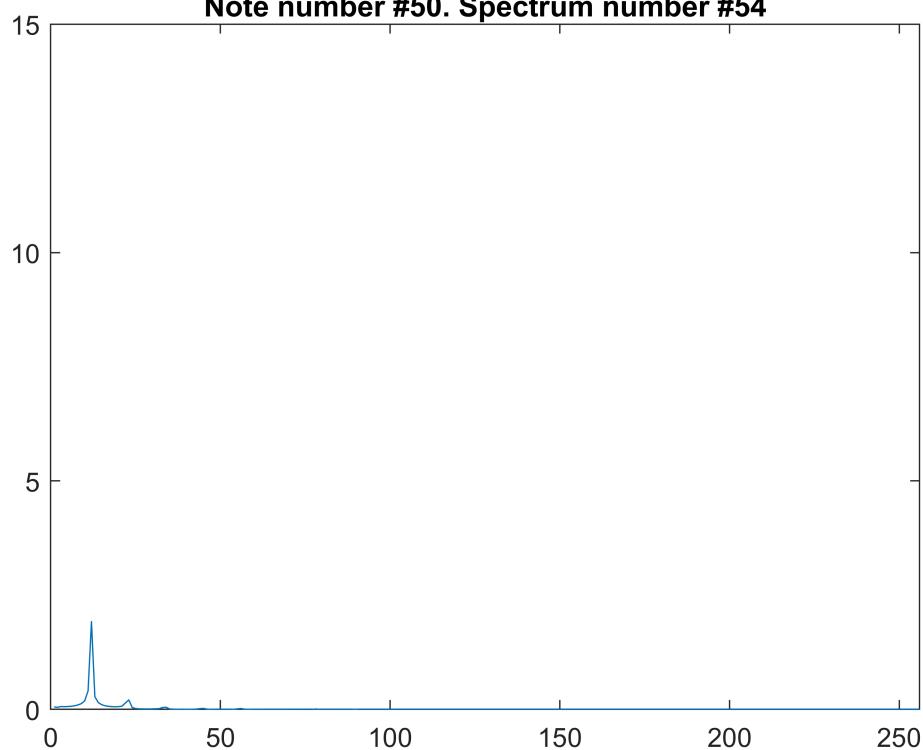
**Note number #50. Spectrum number #52**



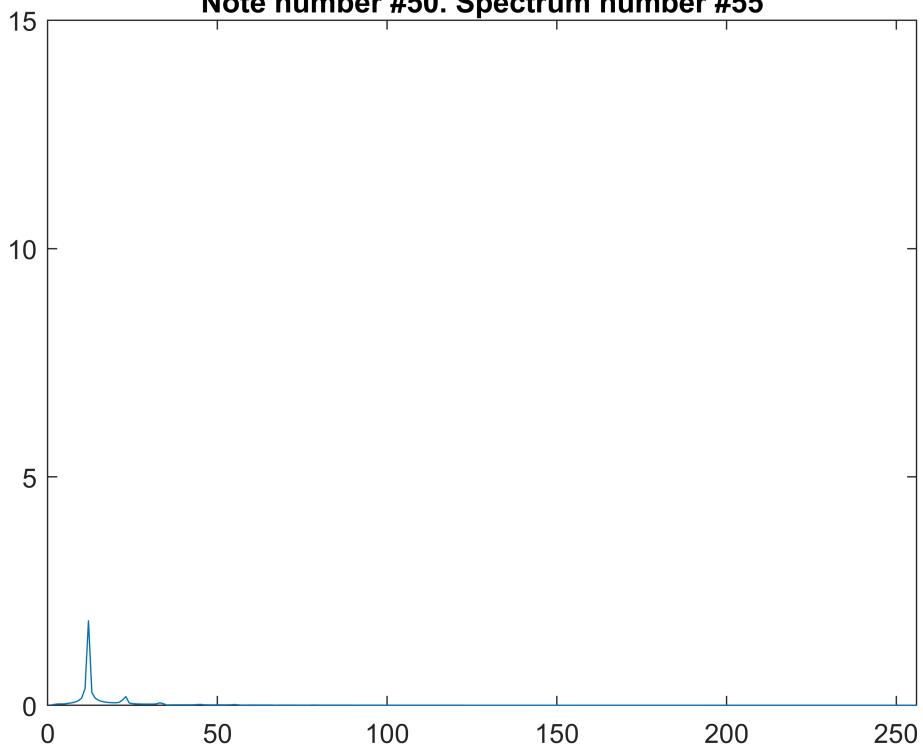
**Note number #50. Spectrum number #53**



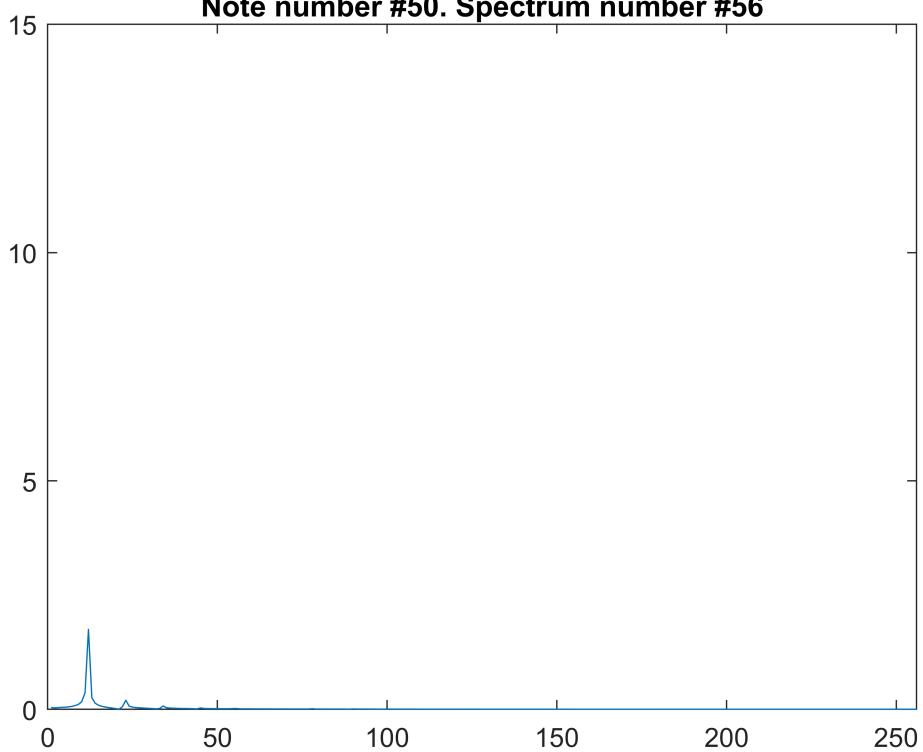
**Note number #50. Spectrum number #54**



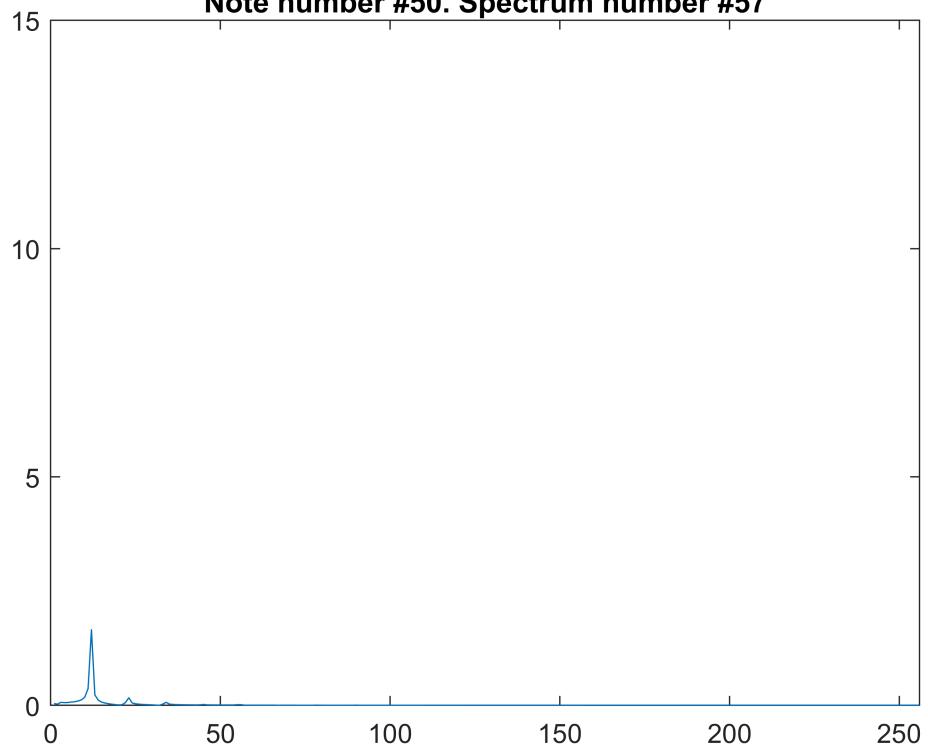
**Note number #50. Spectrum number #55**



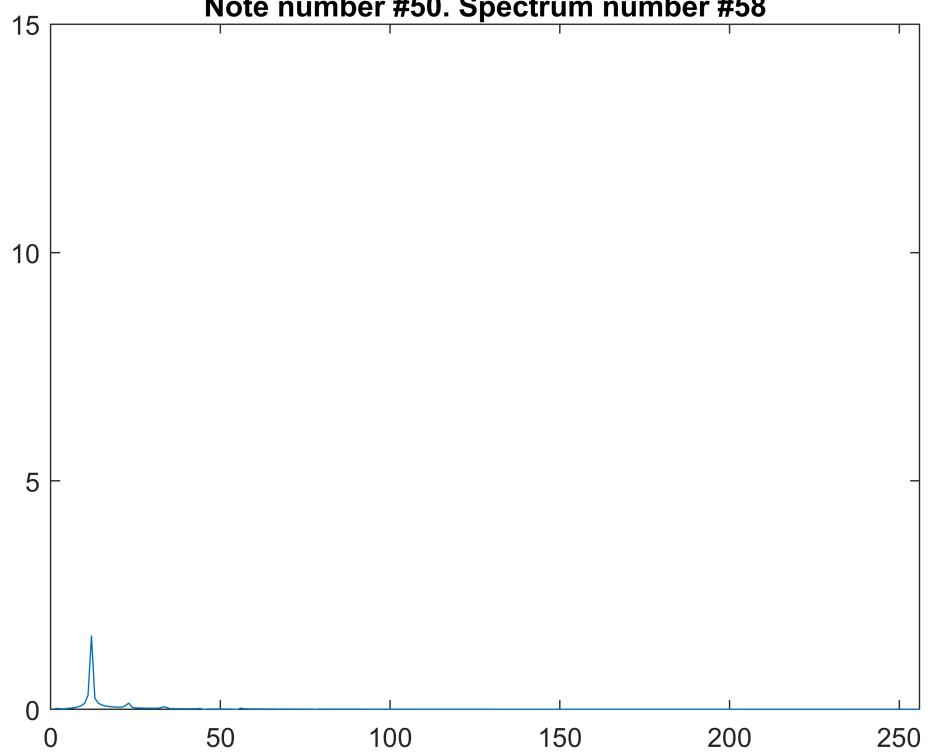
**Note number #50. Spectrum number #56**



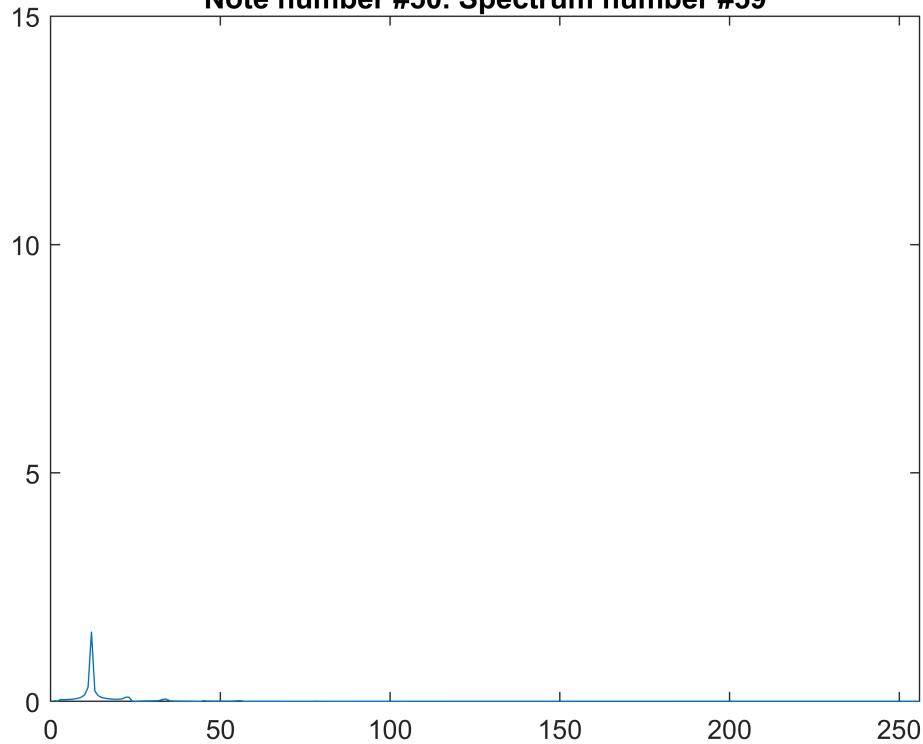
**Note number #50. Spectrum number #57**



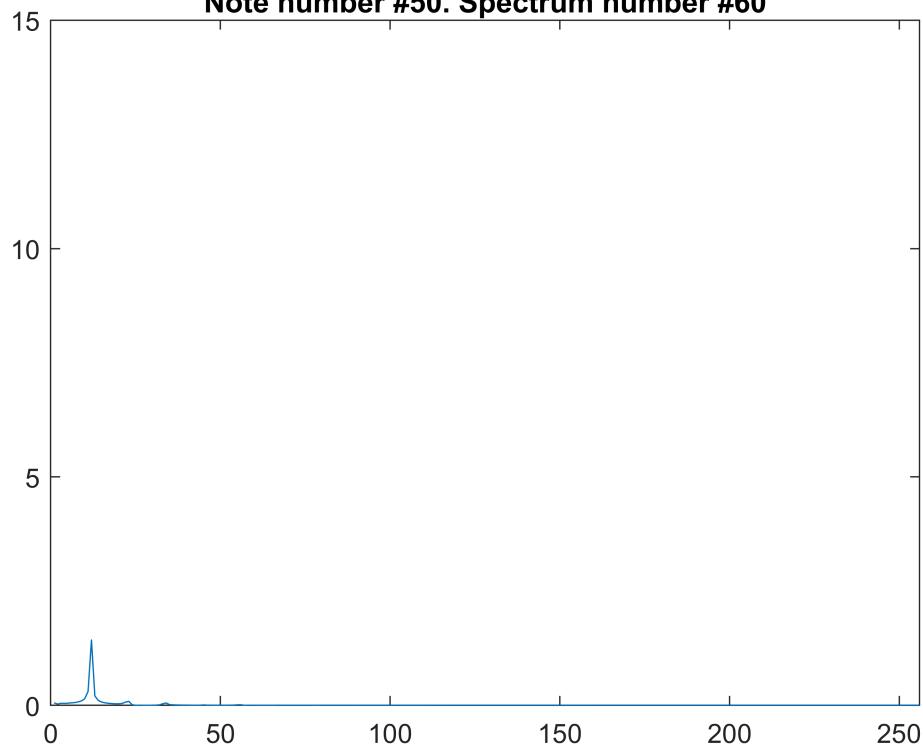
**Note number #50. Spectrum number #58**



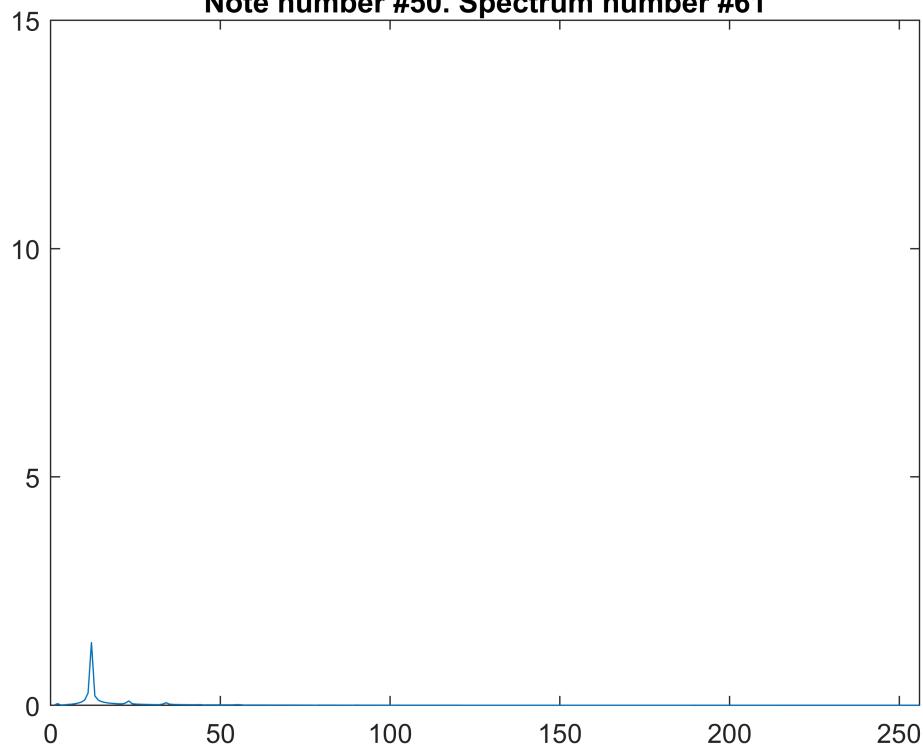
**Note number #50. Spectrum number #59**



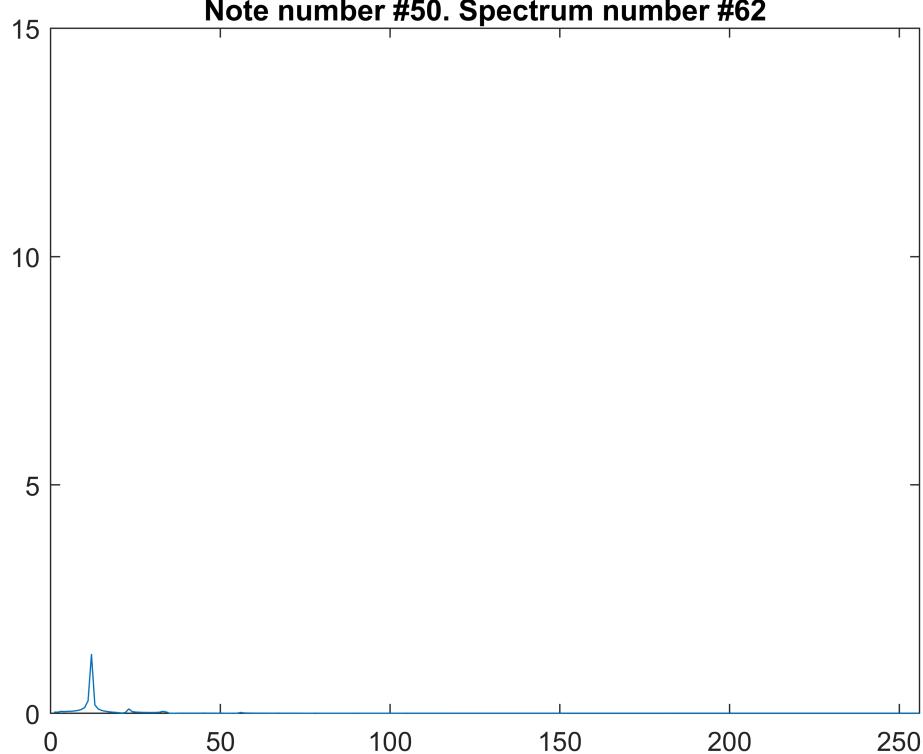
**Note number #50. Spectrum number #60**



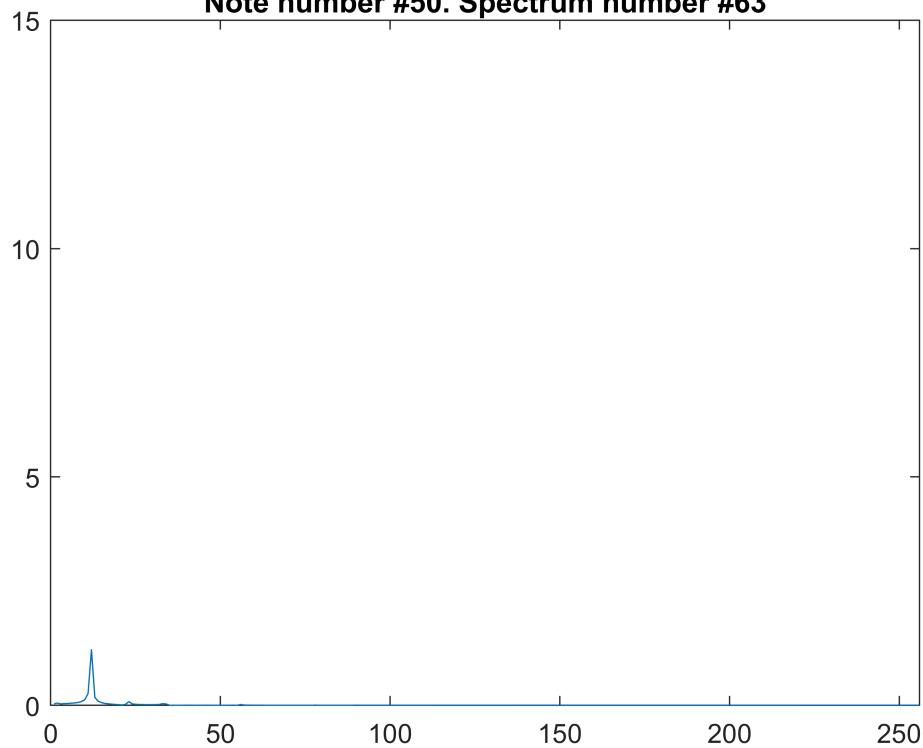
**Note number #50. Spectrum number #61**



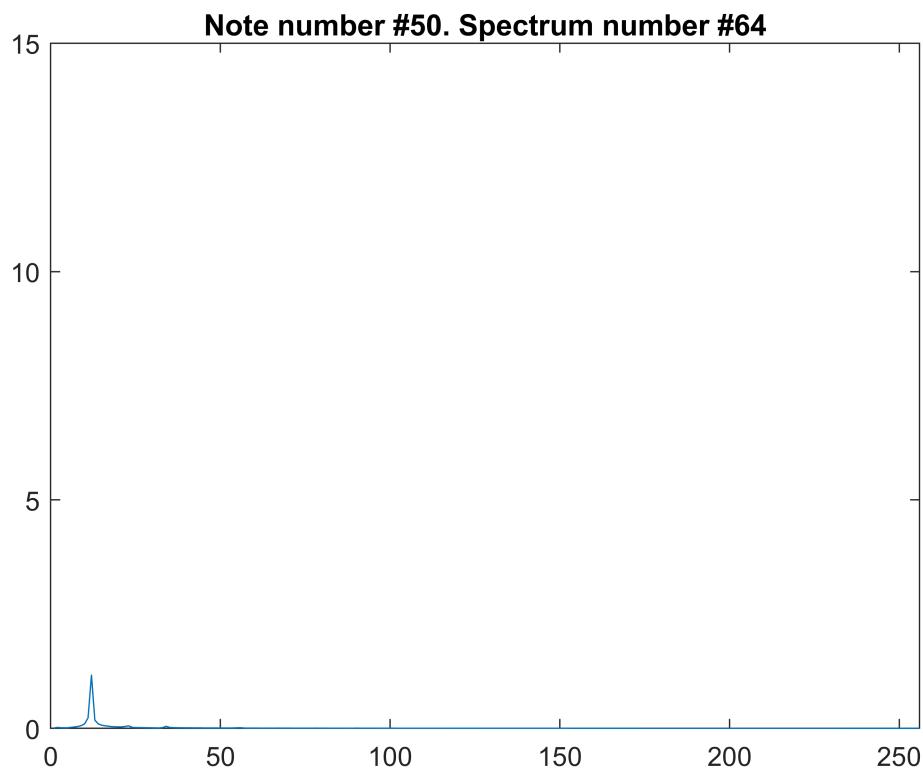
**Note number #50. Spectrum number #62**



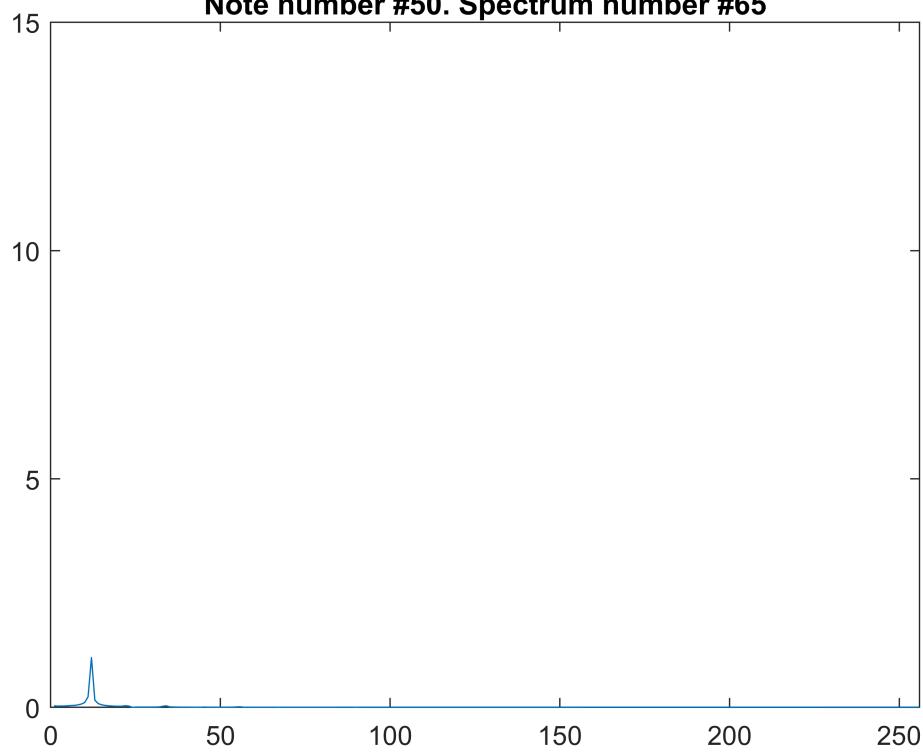
**Note number #50. Spectrum number #63**



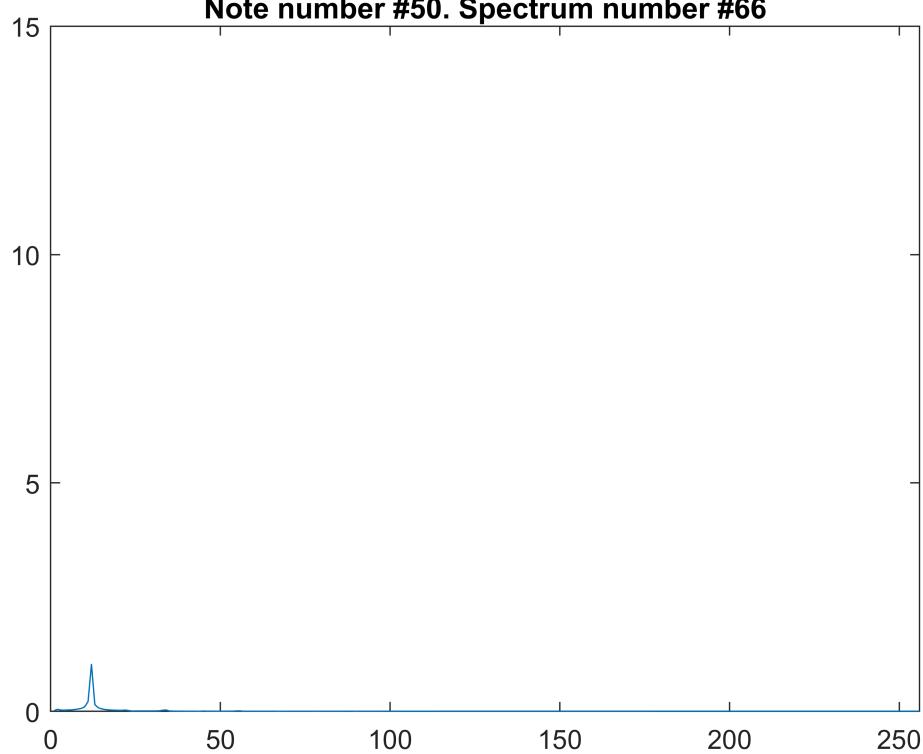
**Note number #50. Spectrum number #64**



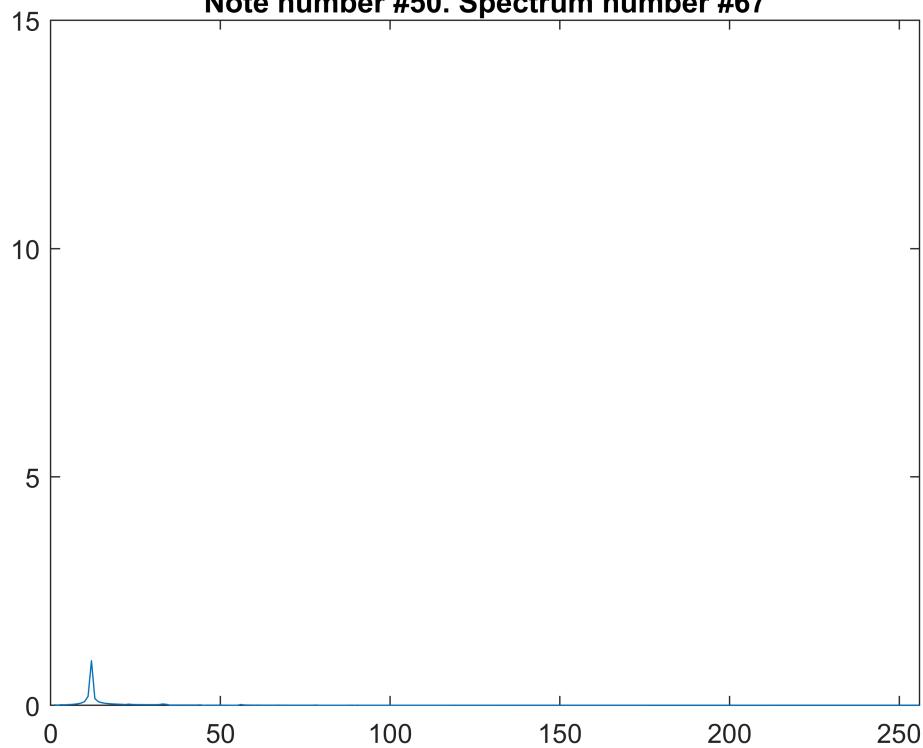
**Note number #50. Spectrum number #65**



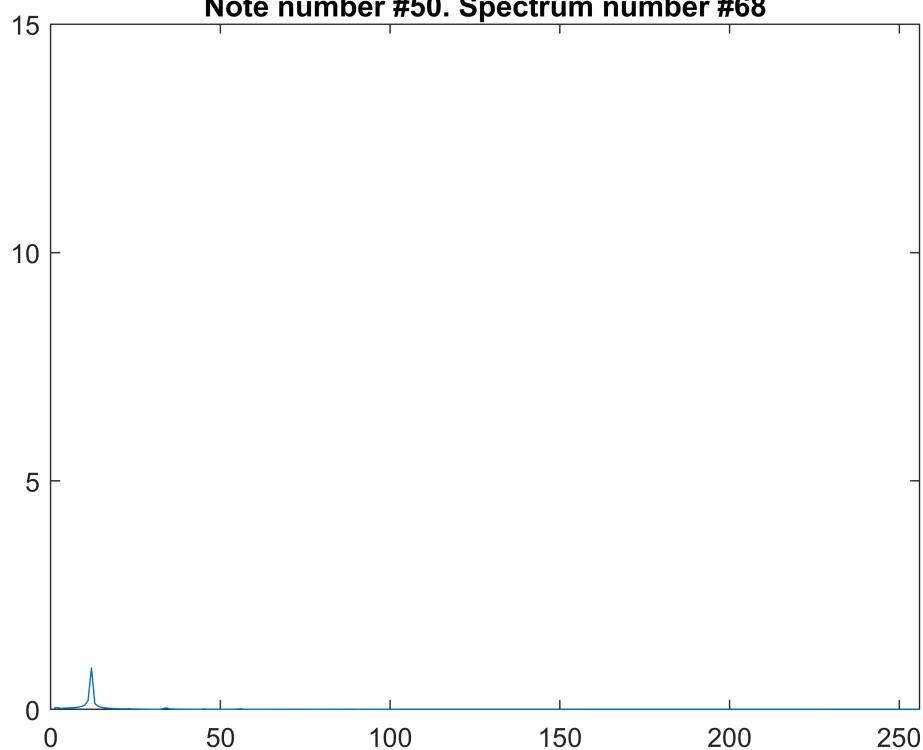
**Note number #50. Spectrum number #66**



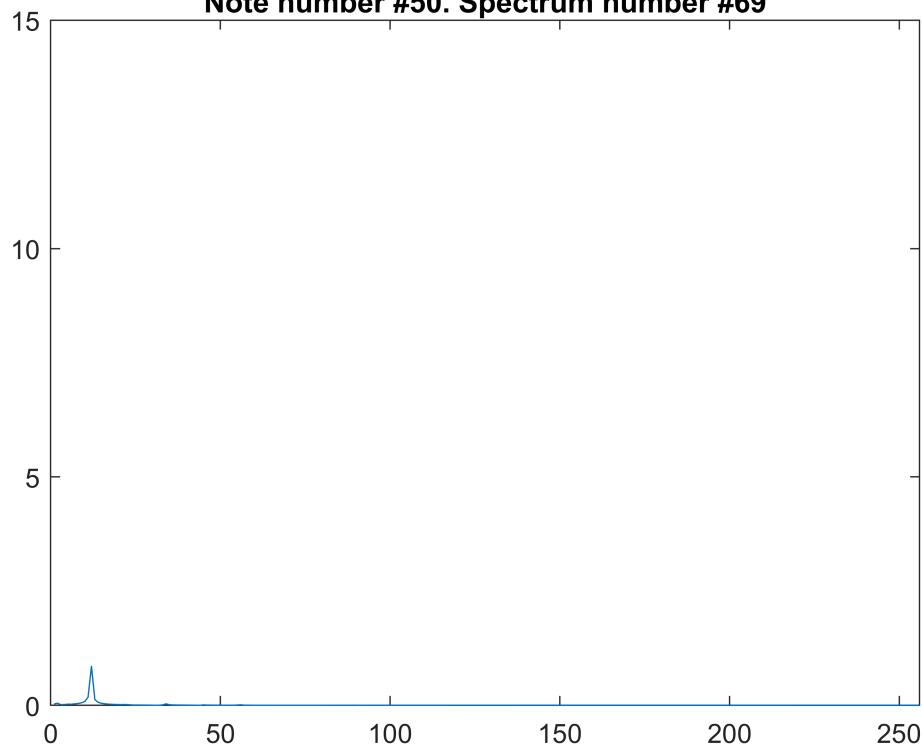
**Note number #50. Spectrum number #67**



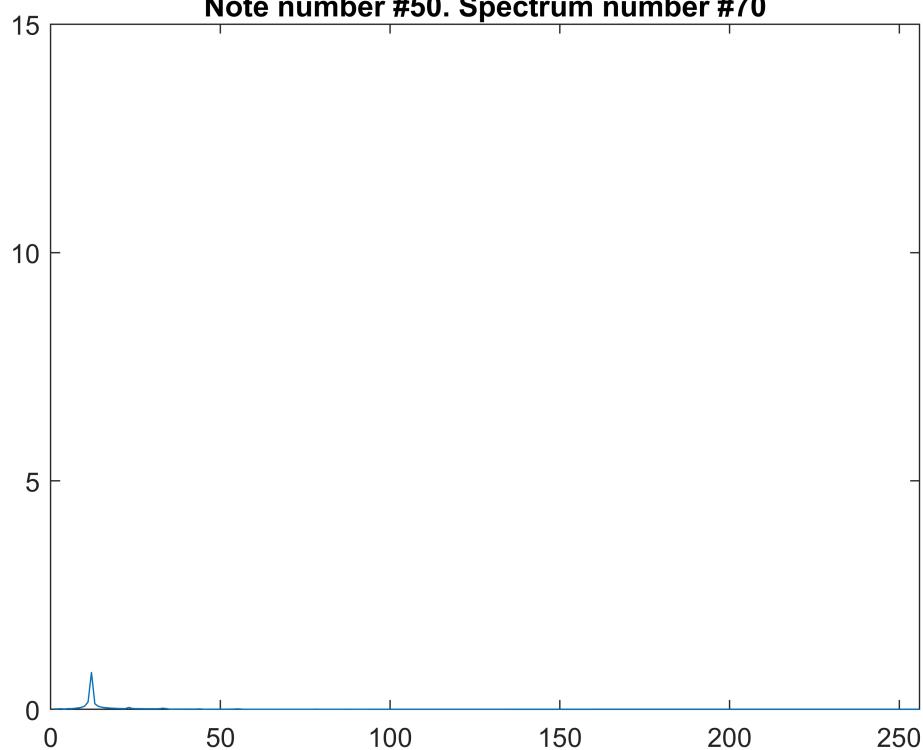
**Note number #50. Spectrum number #68**



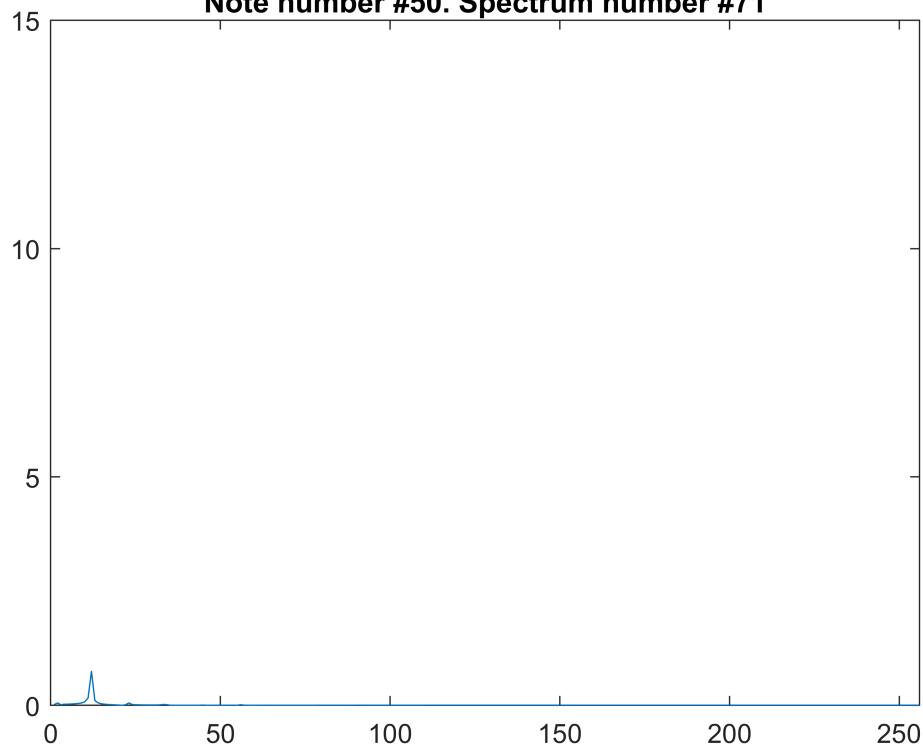
**Note number #50. Spectrum number #69**



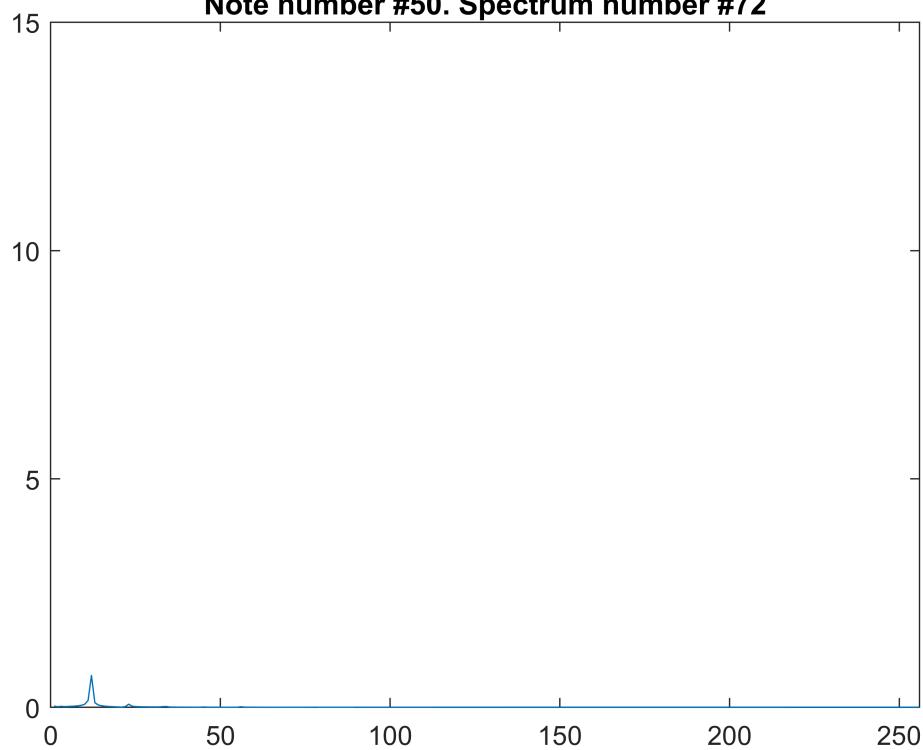
**Note number #50. Spectrum number #70**



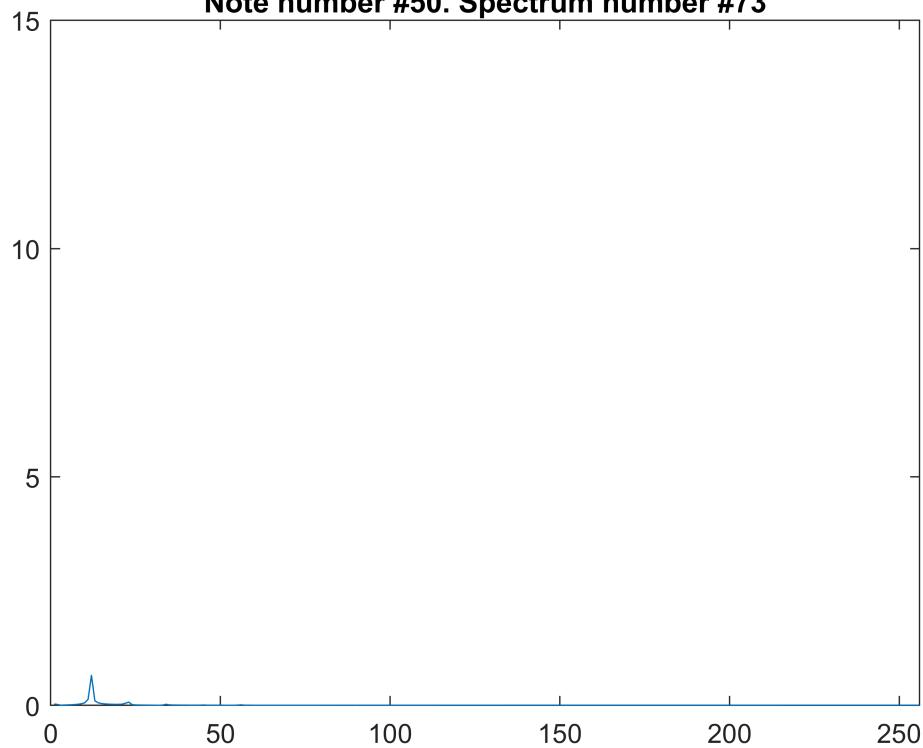
**Note number #50. Spectrum number #71**



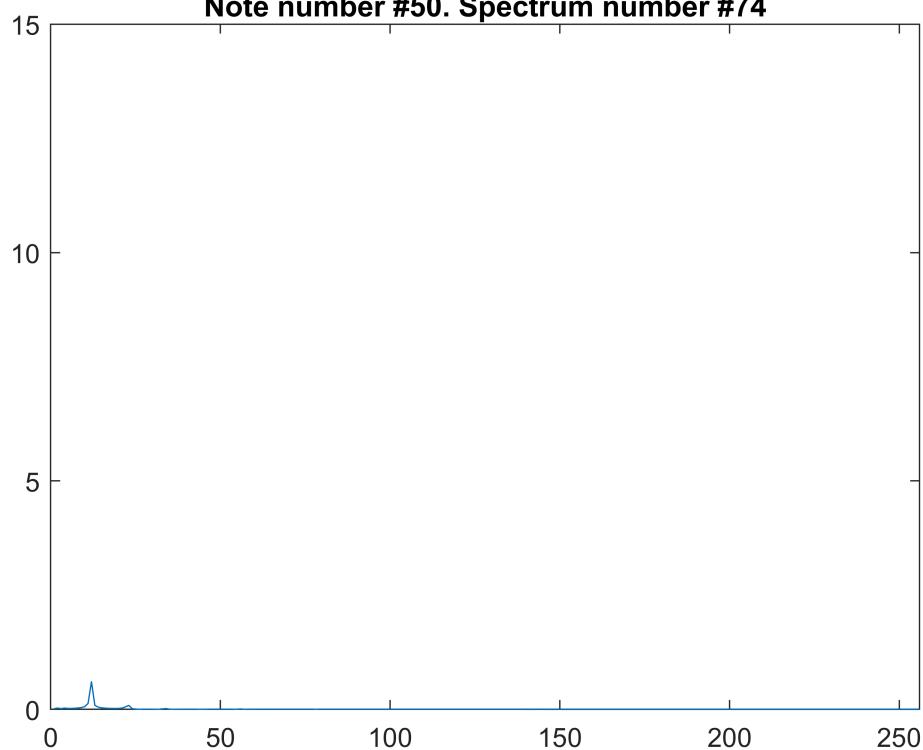
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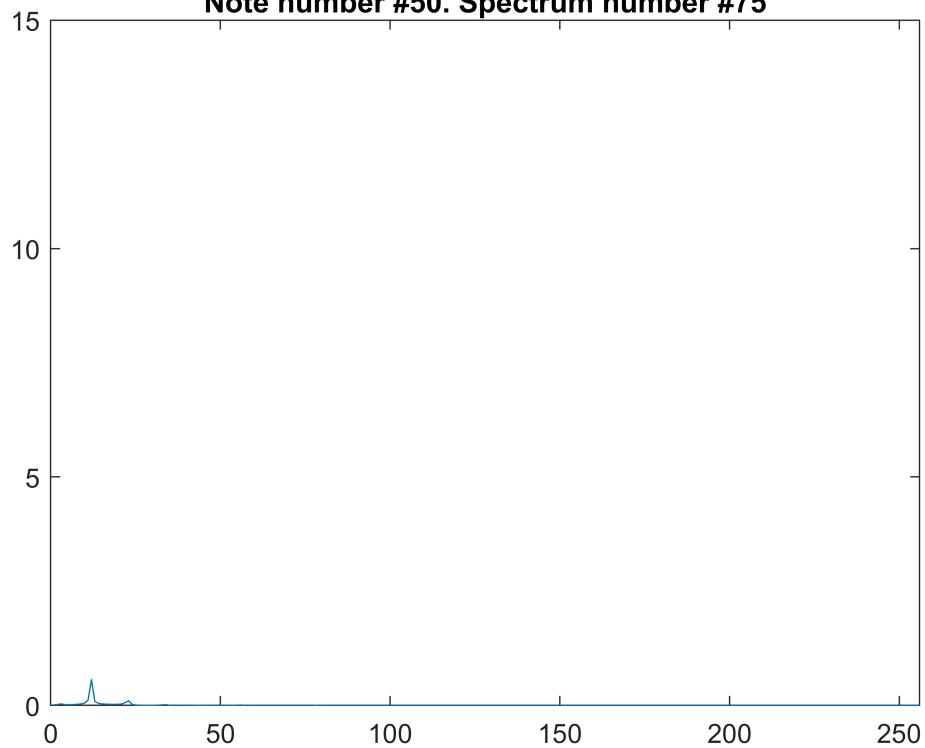
**Note number #50. Spectrum number #73**



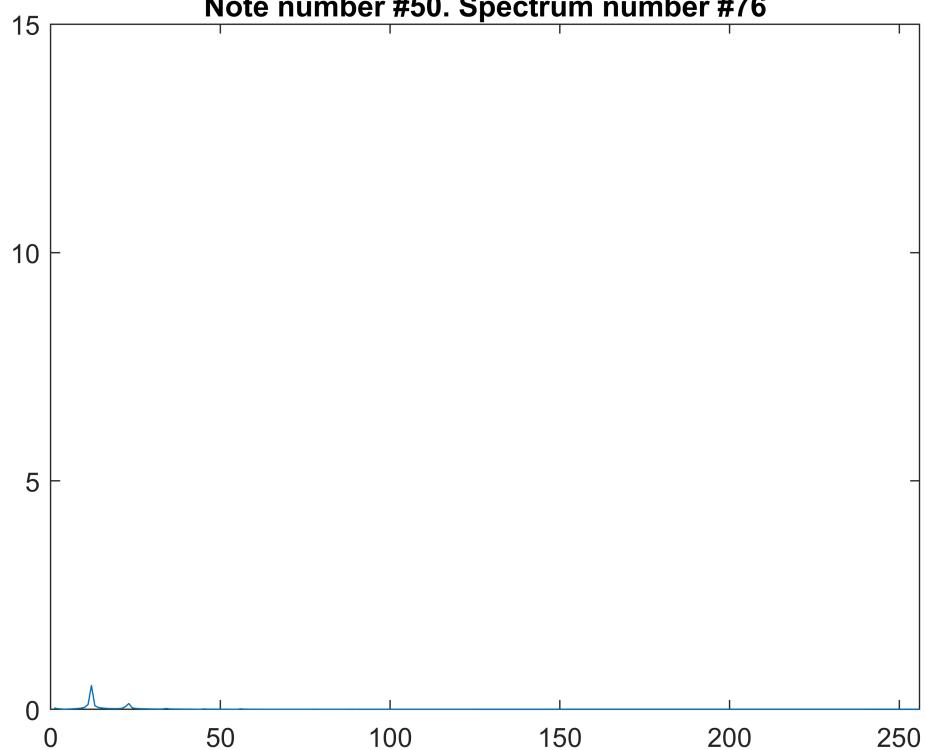
**Note number #50. Spectrum number #74**



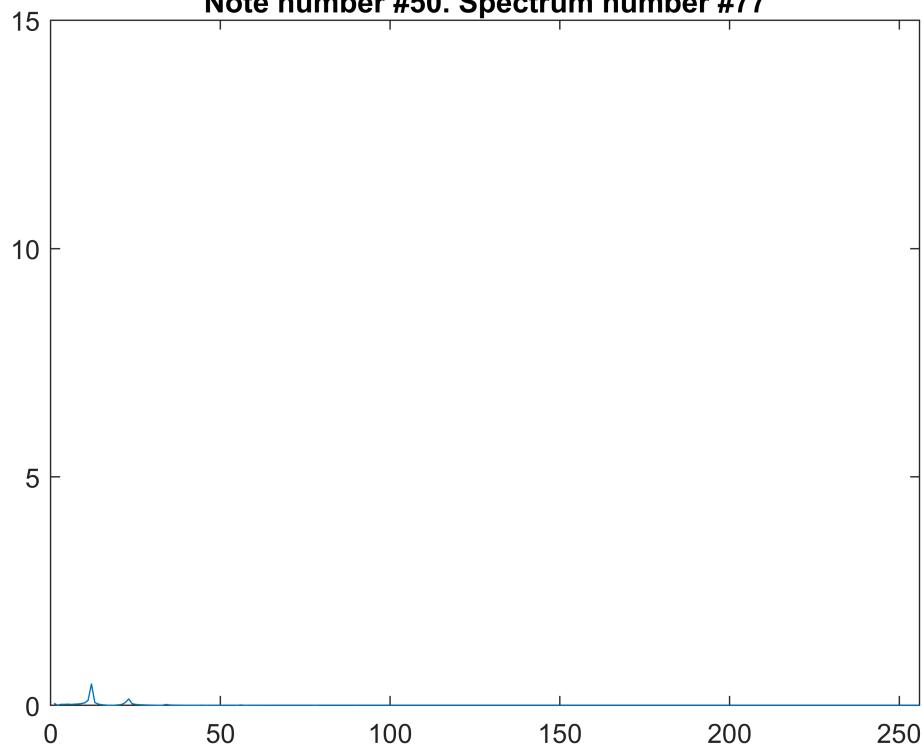
**Note number #50. Spectrum number #75**



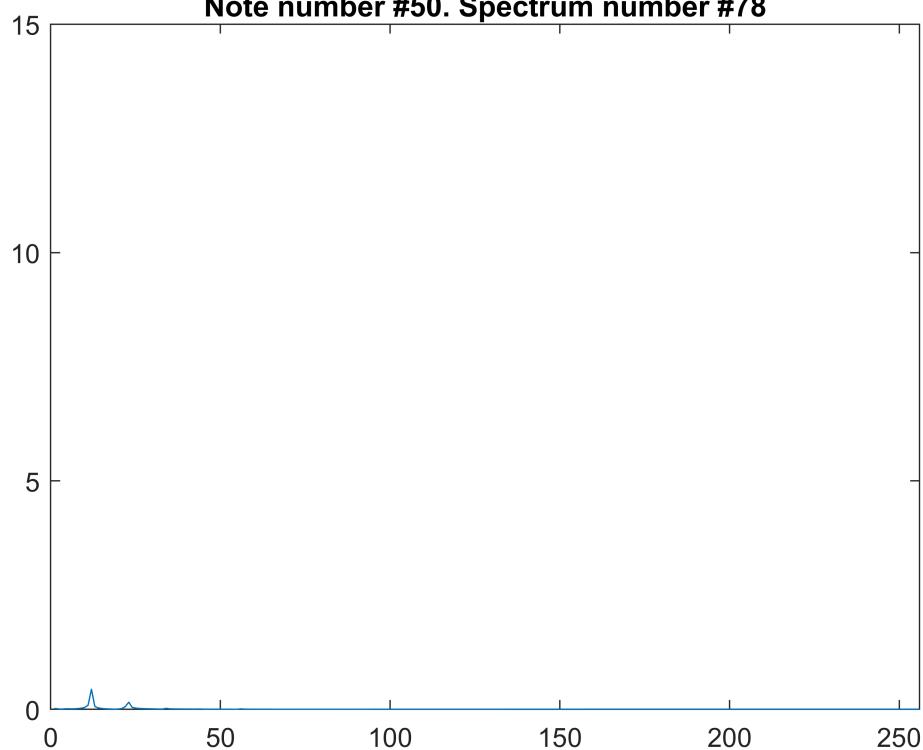
**Note number #50. Spectrum number #76**



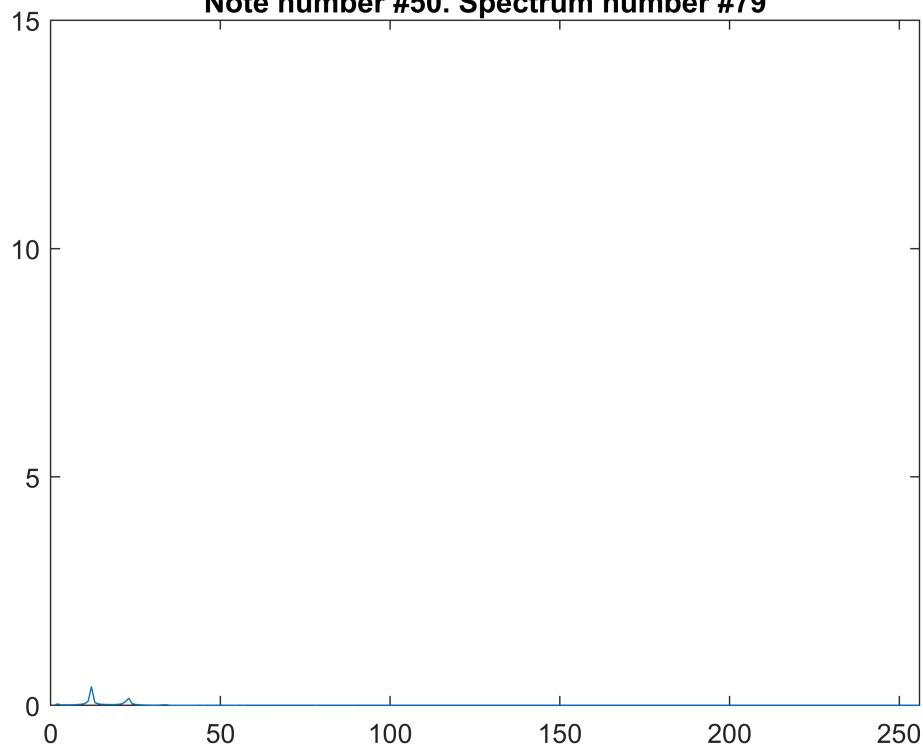
**Note number #50. Spectrum number #77**



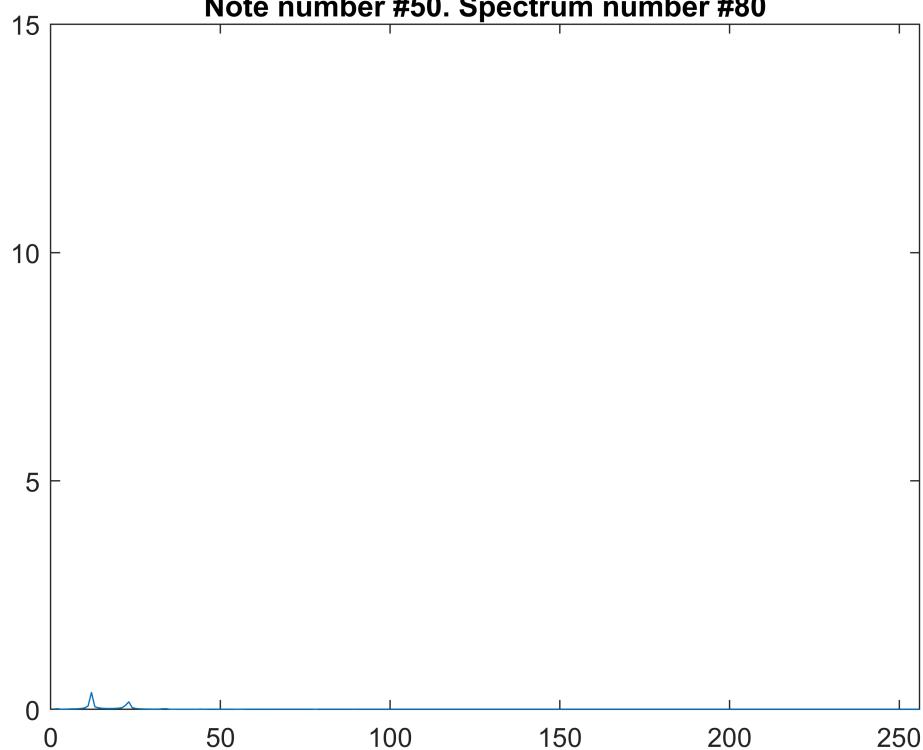
**Note number #50. Spectrum number #78**



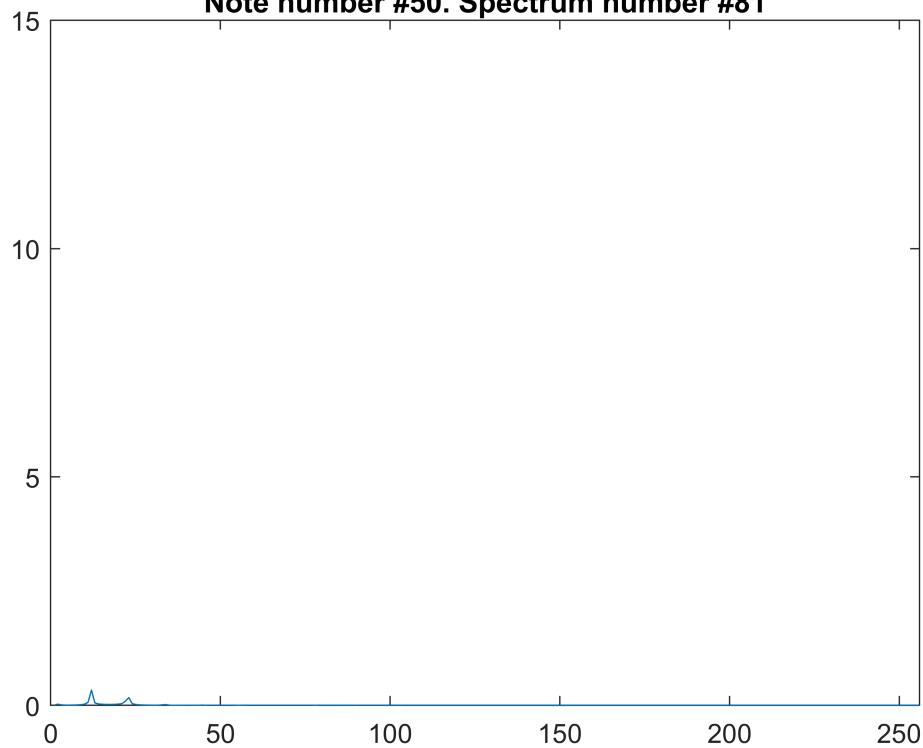
**Note number #50. Spectrum number #79**



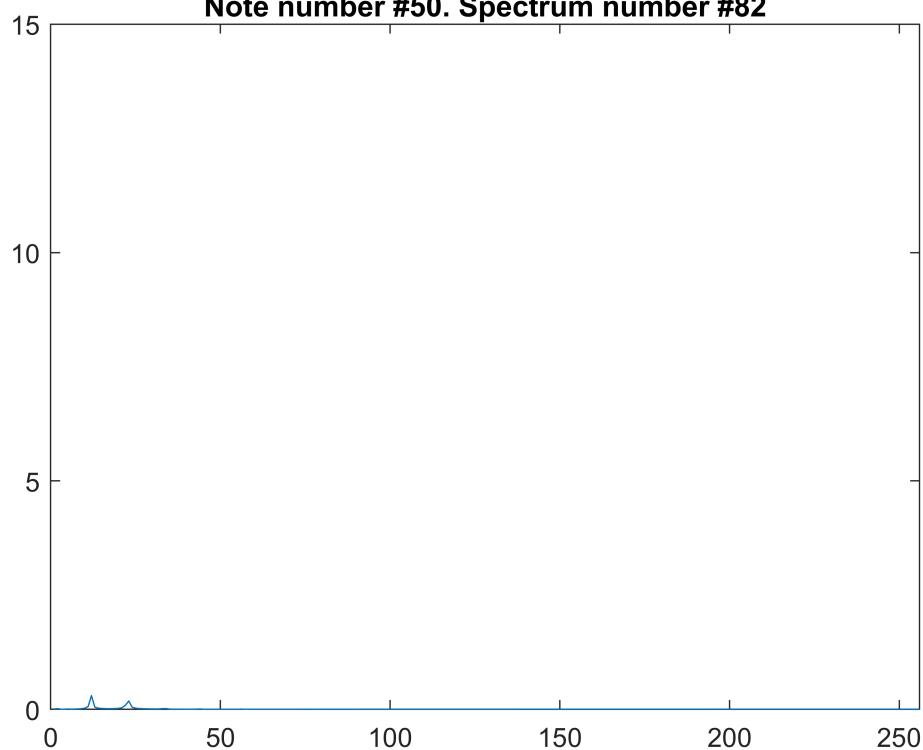
**Note number #50. Spectrum number #80**



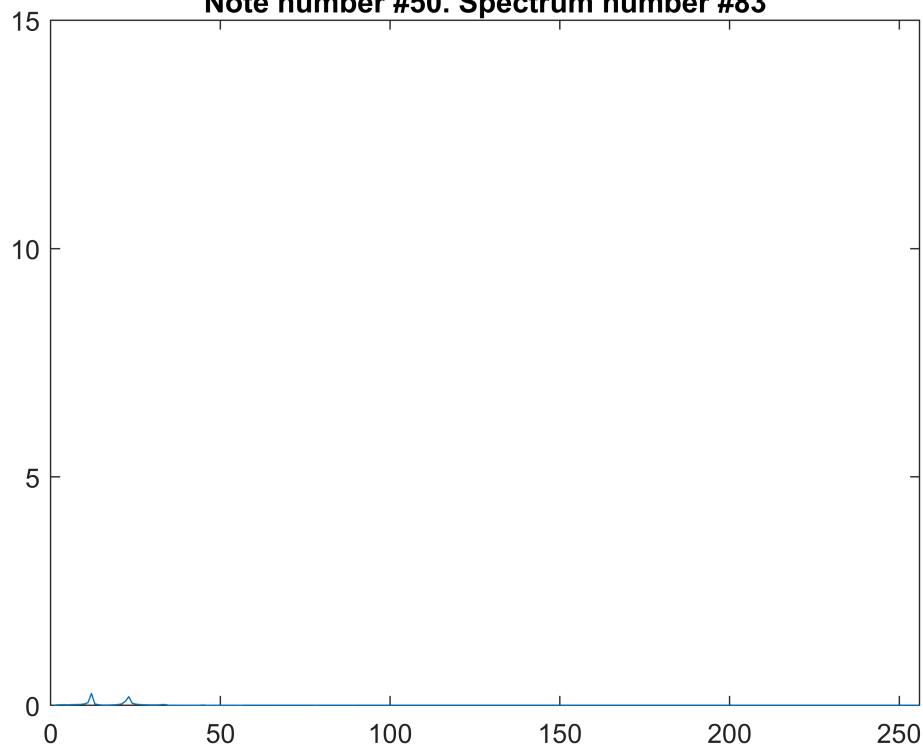
**Note number #50. Spectrum number #81**



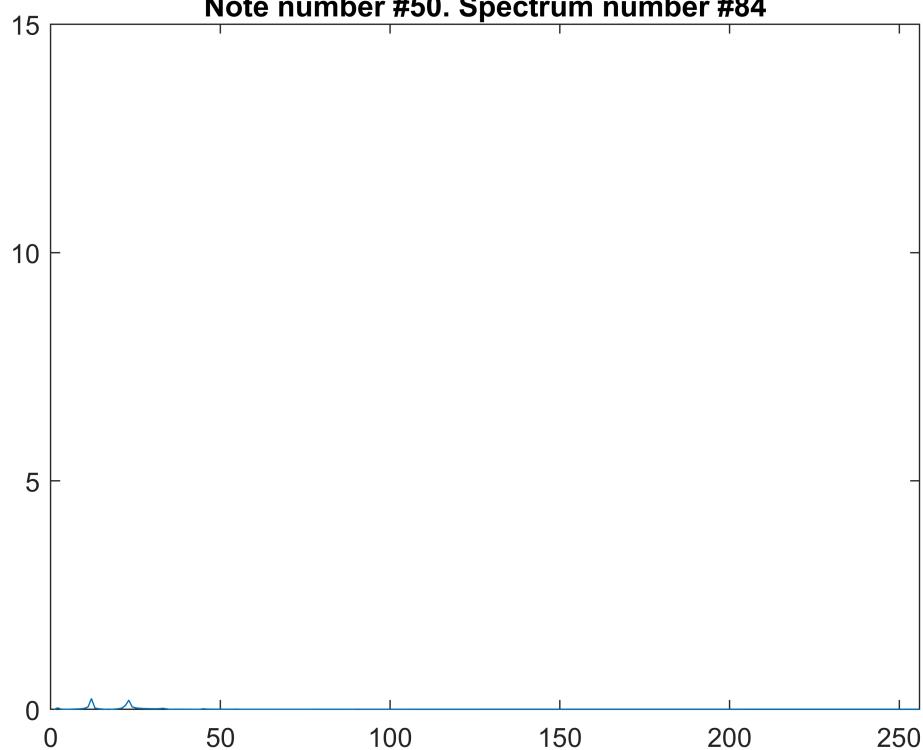
**Note number #50. Spectrum number #82**



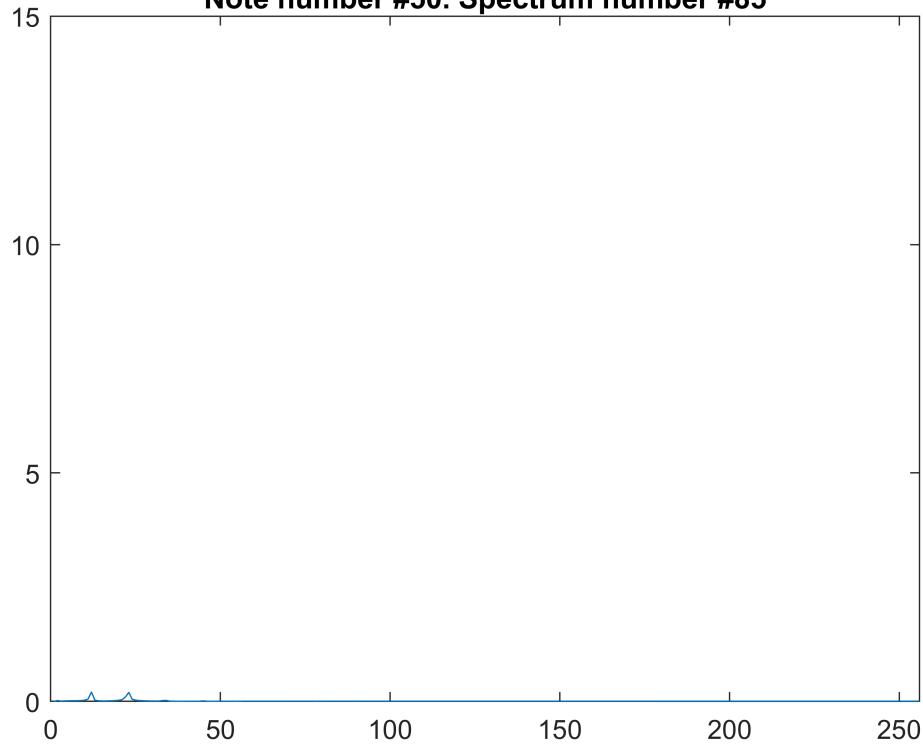
**Note number #50. Spectrum number #83**



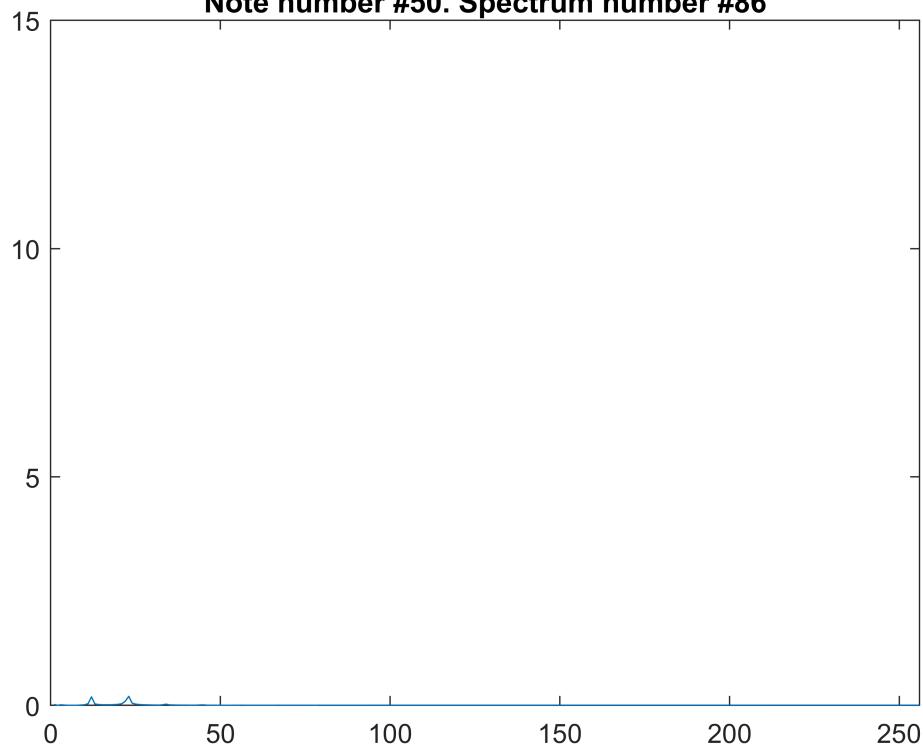
**Note number #50. Spectrum number #84**



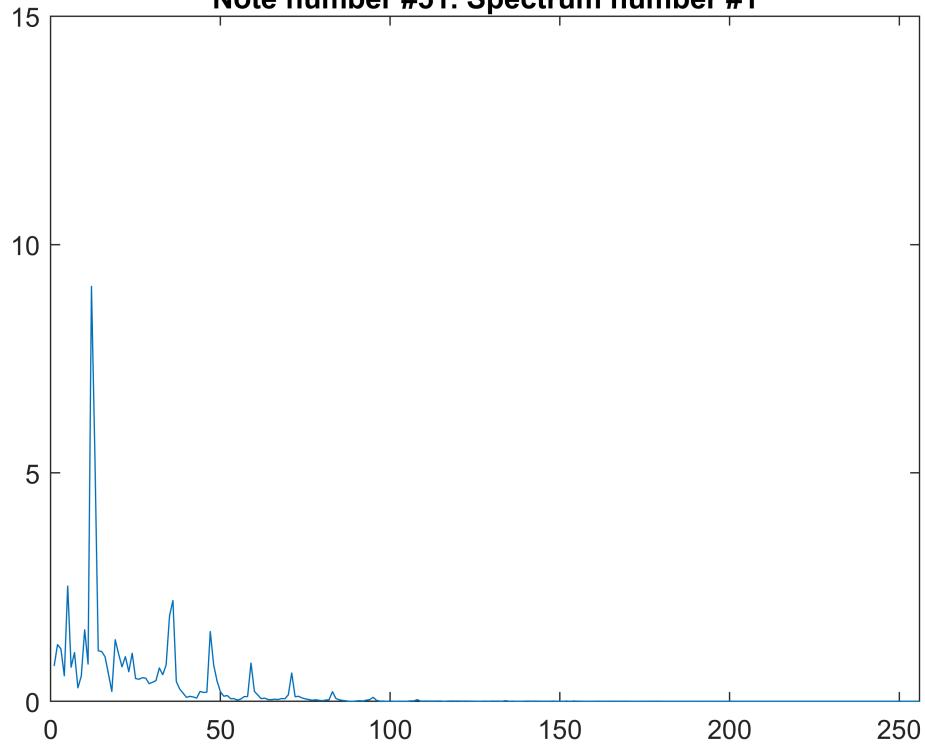
**Note number #50. Spectrum number #85**



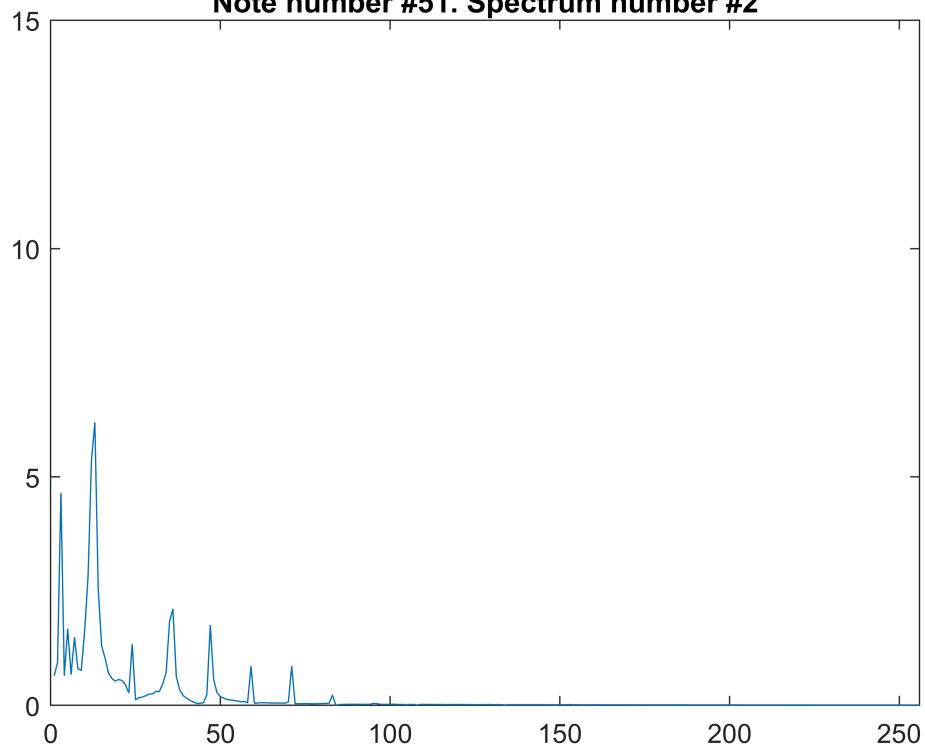
**Note number #50. Spectrum number #86**



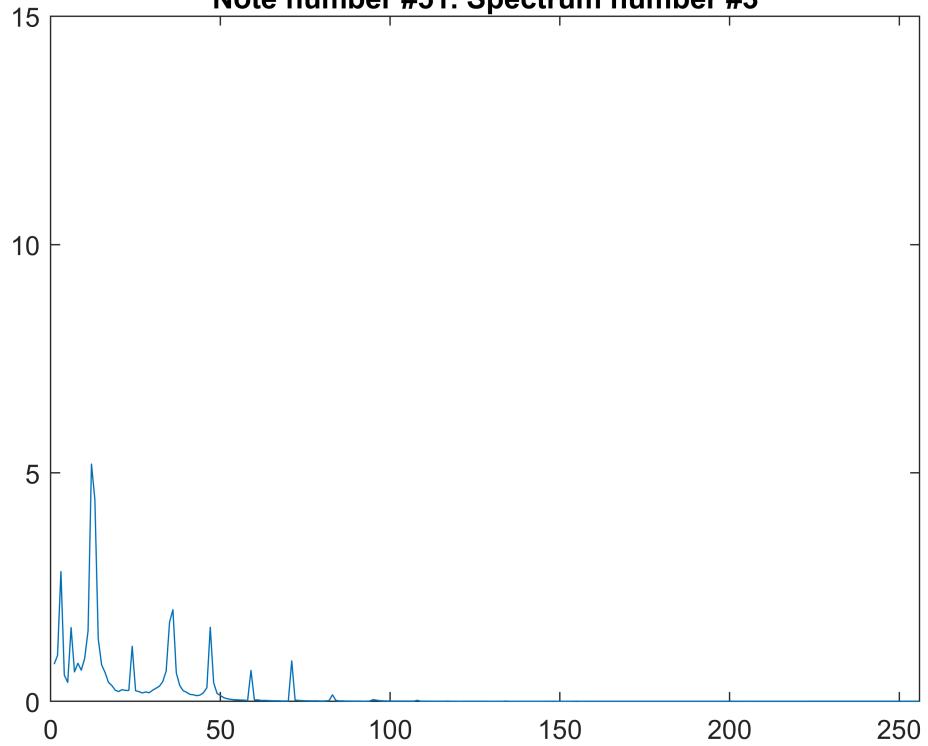
**Note number #51. Spectrum number #1**



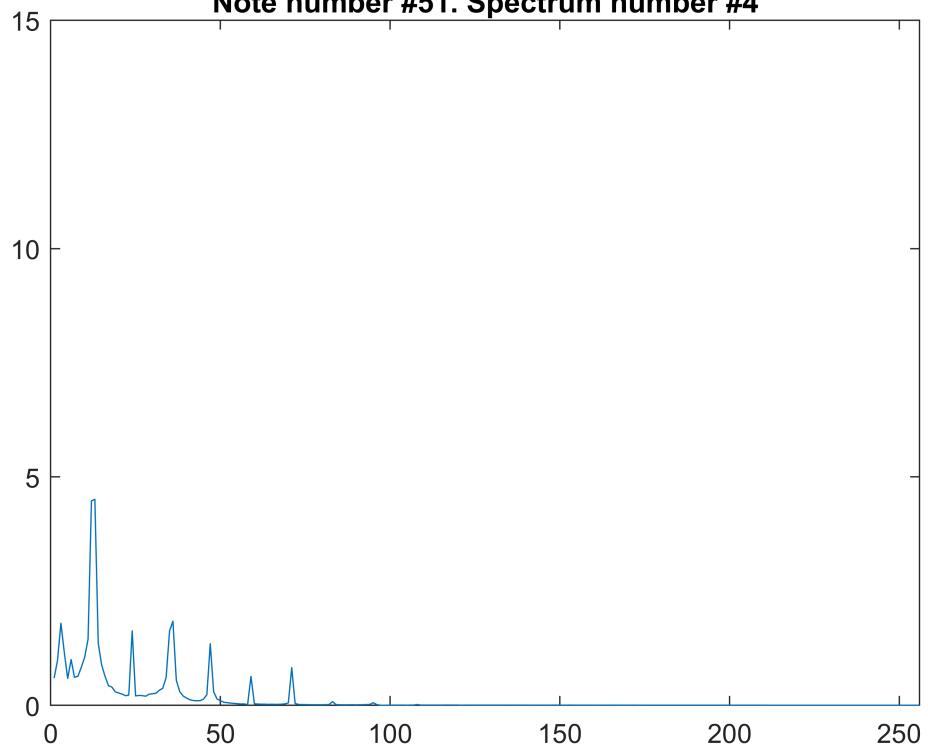
**Note number #51. Spectrum number #2**



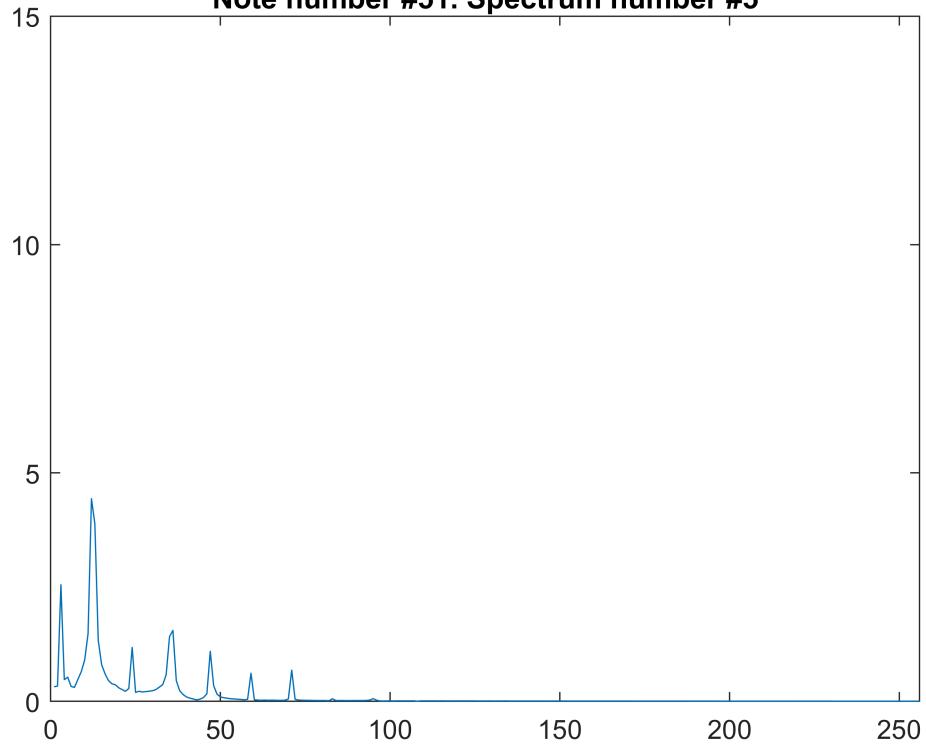
**Note number #51. Spectrum number #3**



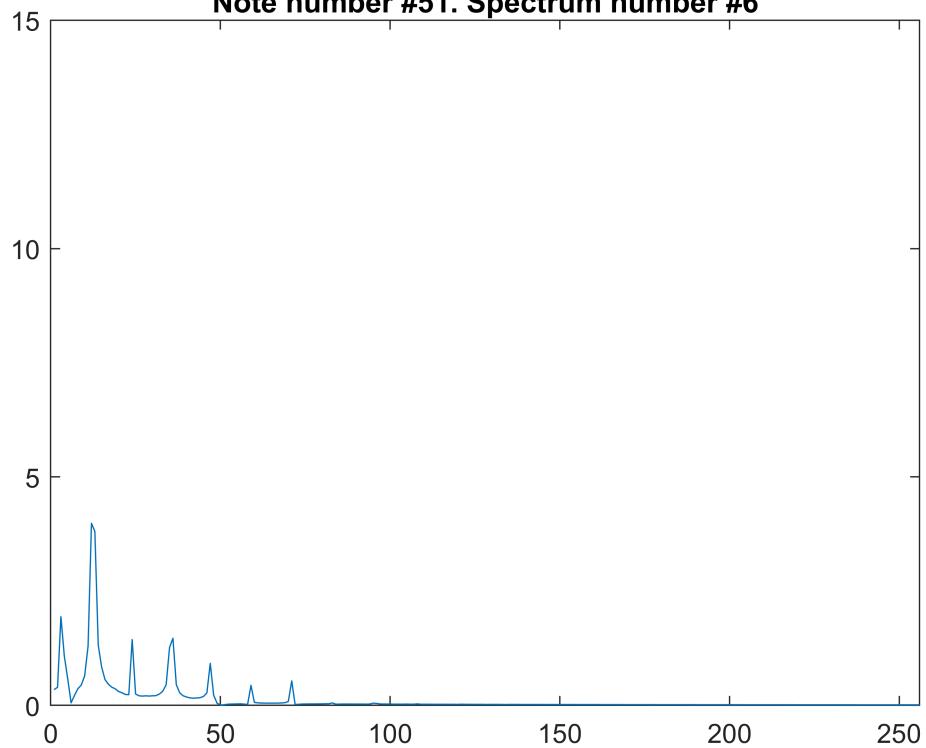
**Note number #51. Spectrum number #4**



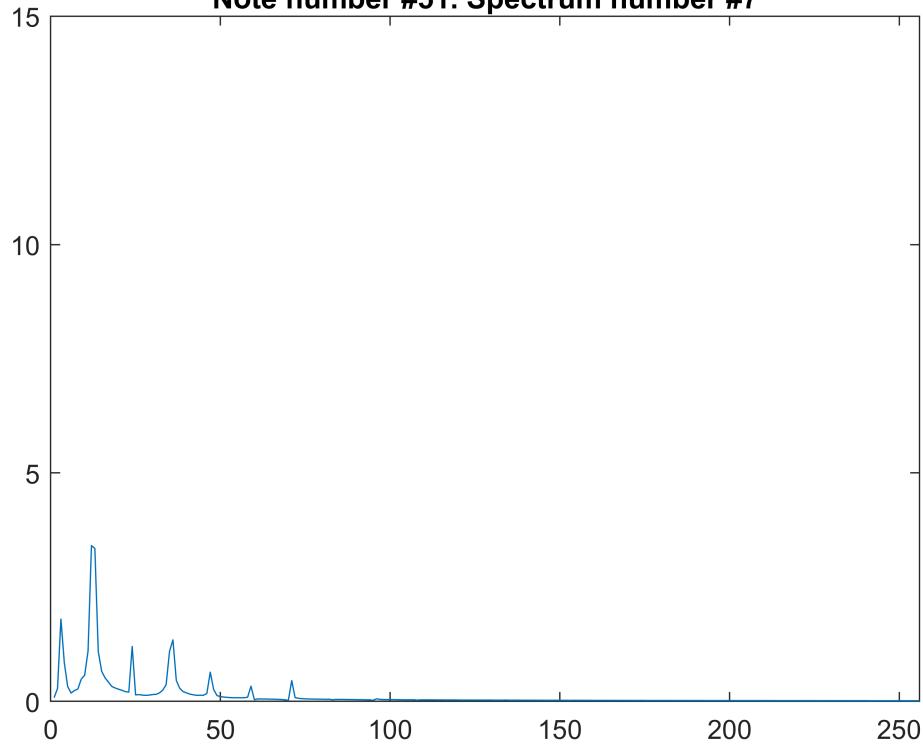
**Note number #51. Spectrum number #5**



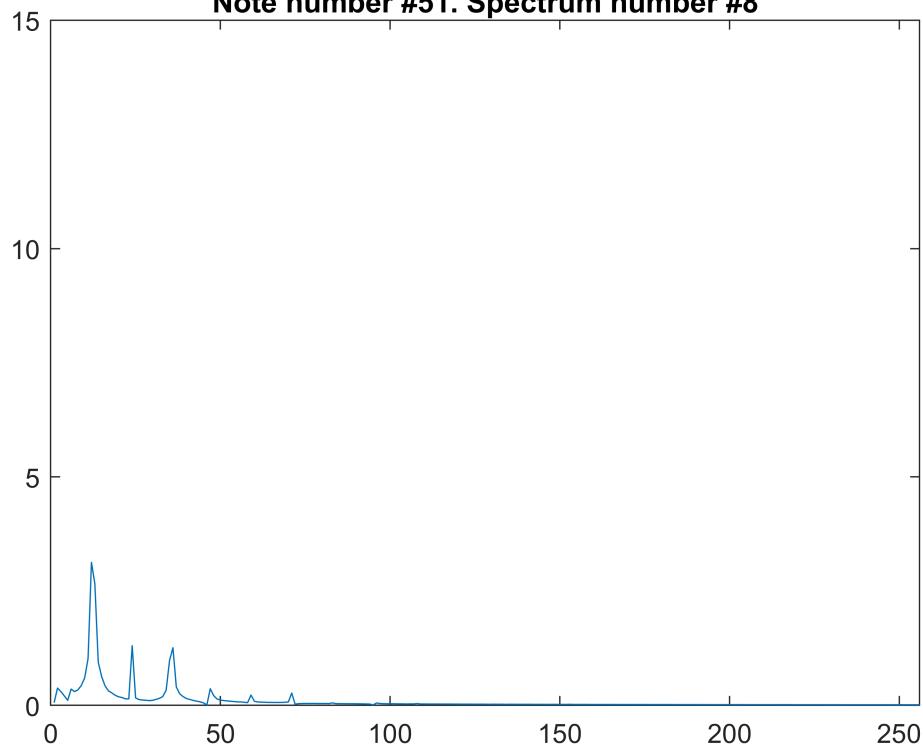
**Note number #51. Spectrum number #6**



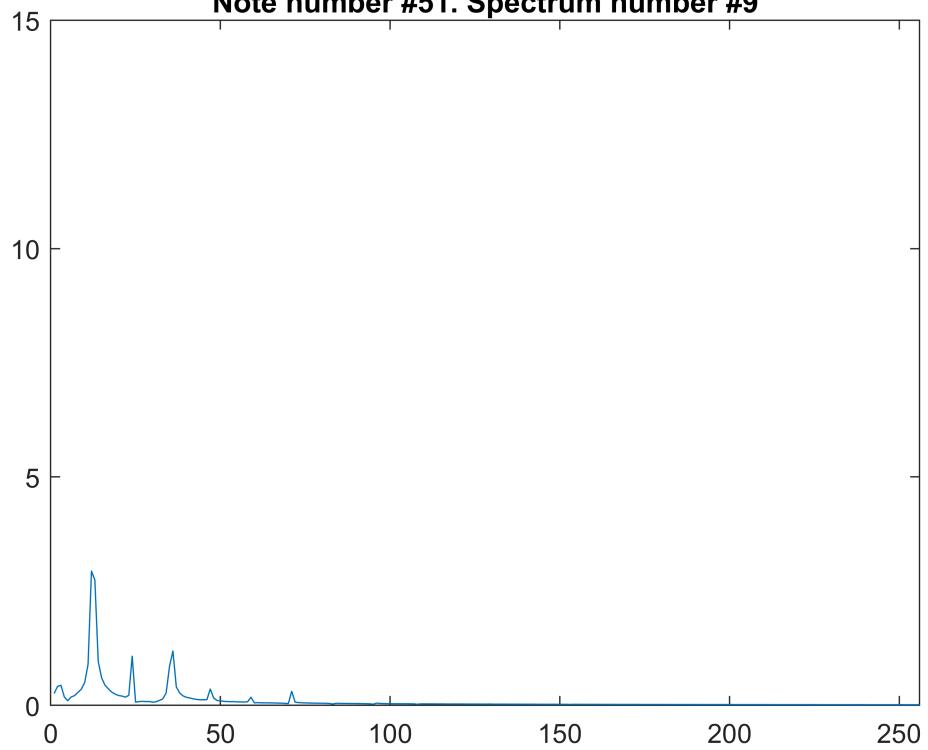
**Note number #51. Spectrum number #7**



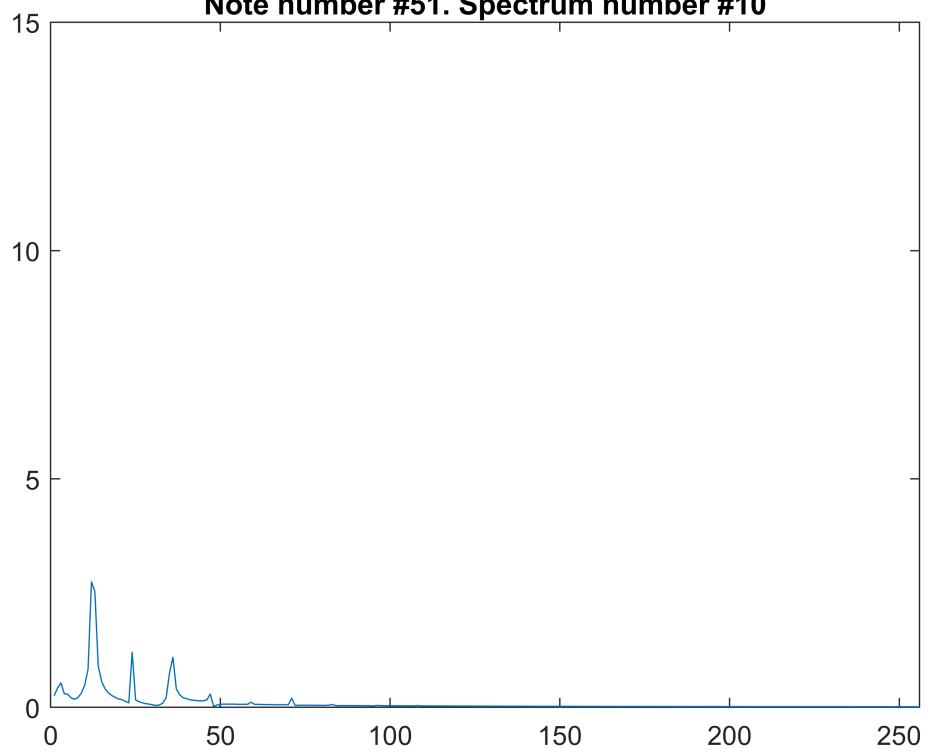
**Note number #51. Spectrum number #8**



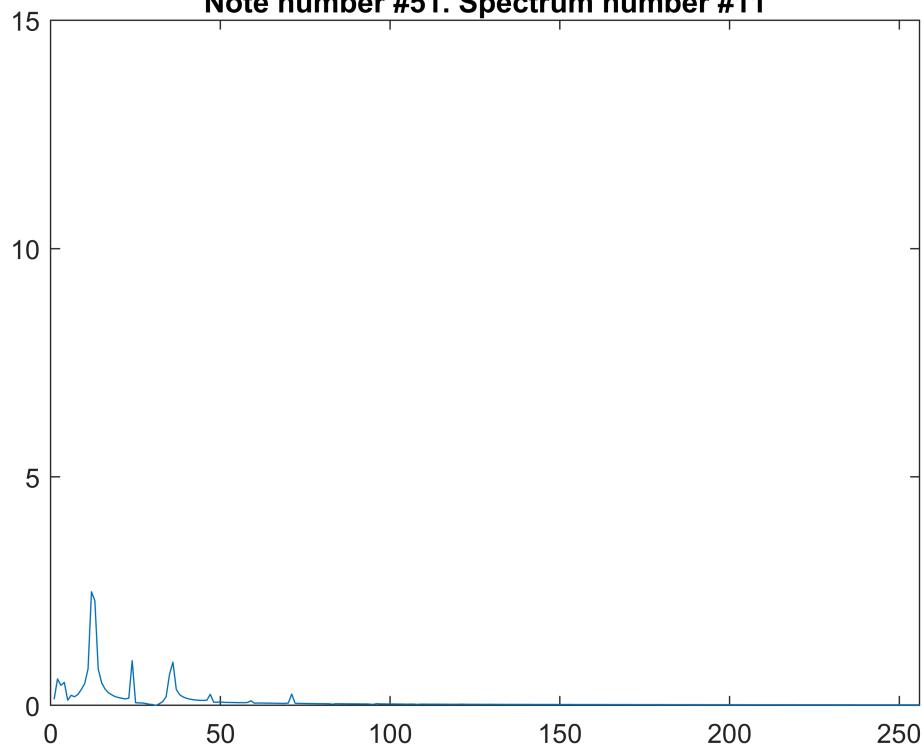
**Note number #51. Spectrum number #9**



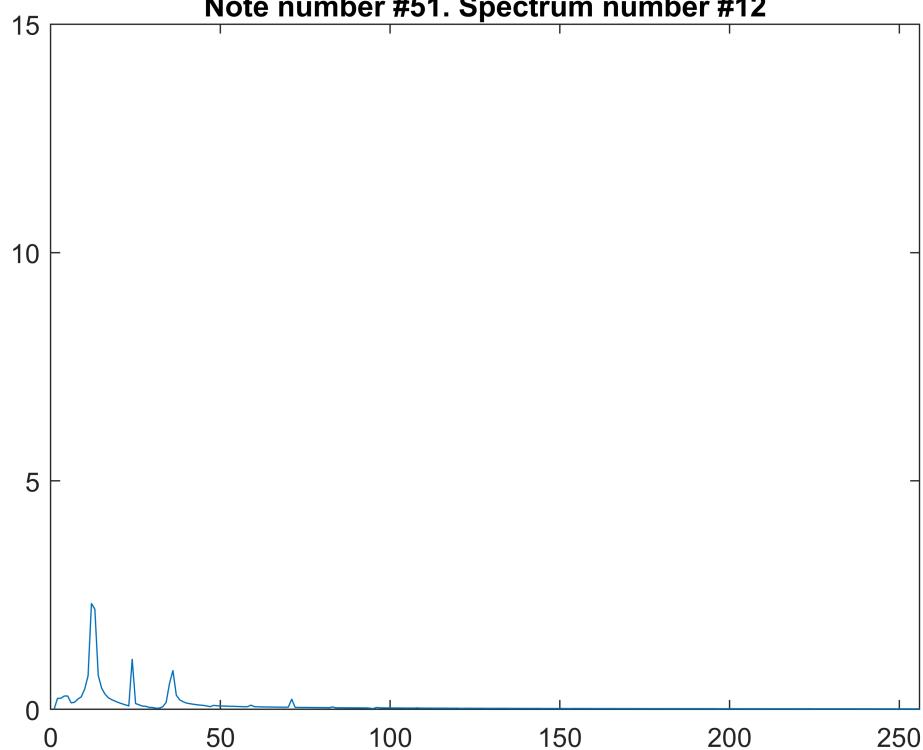
**Note number #51. Spectrum number #10**



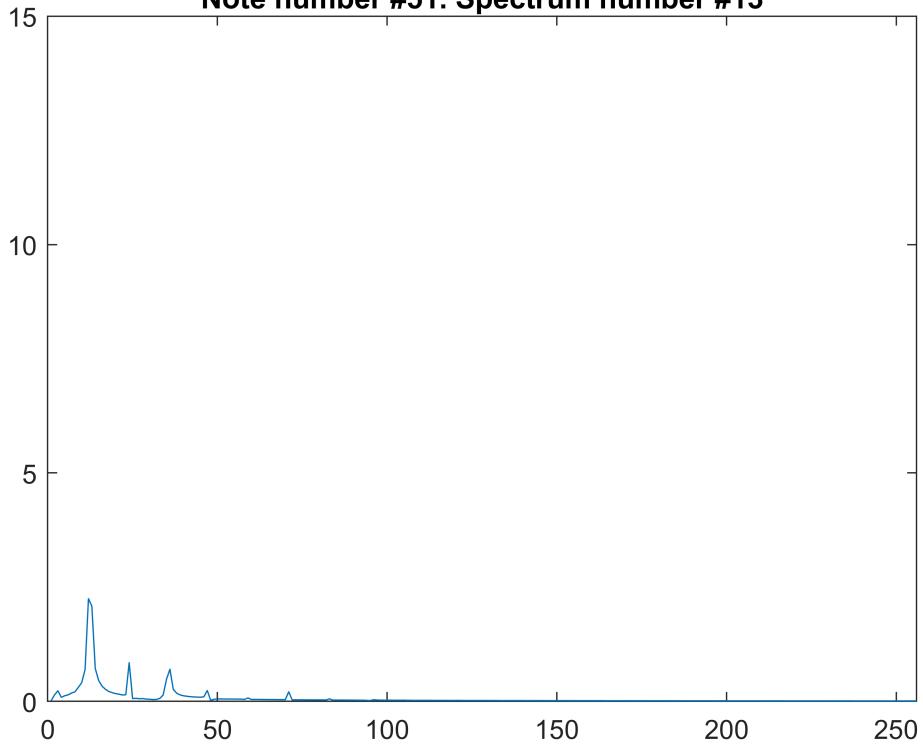
**Note number #51. Spectrum number #11**



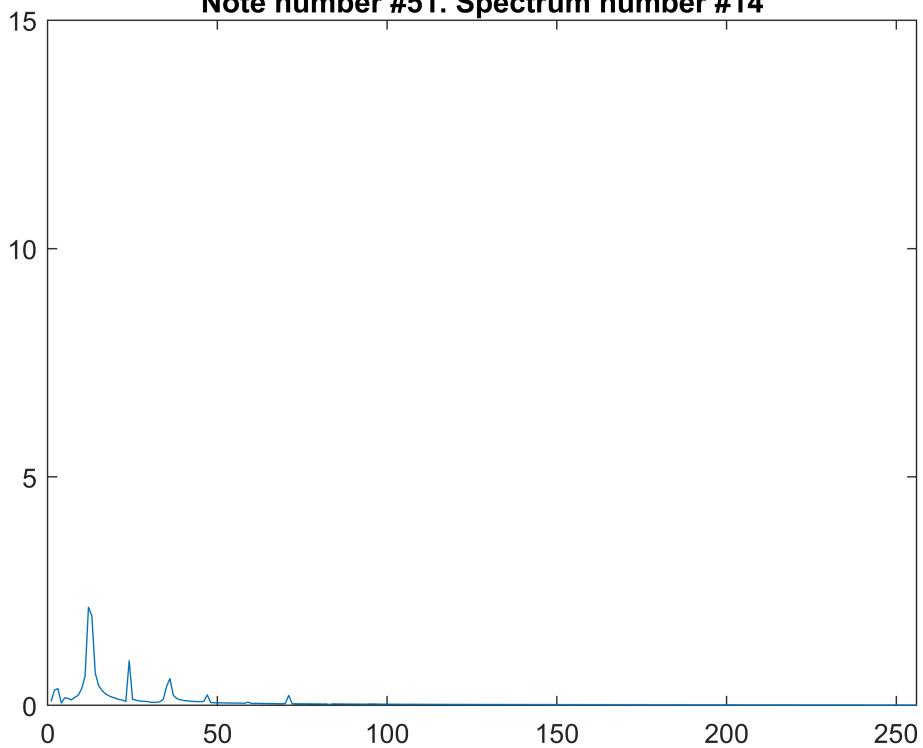
**Note number #51. Spectrum number #12**



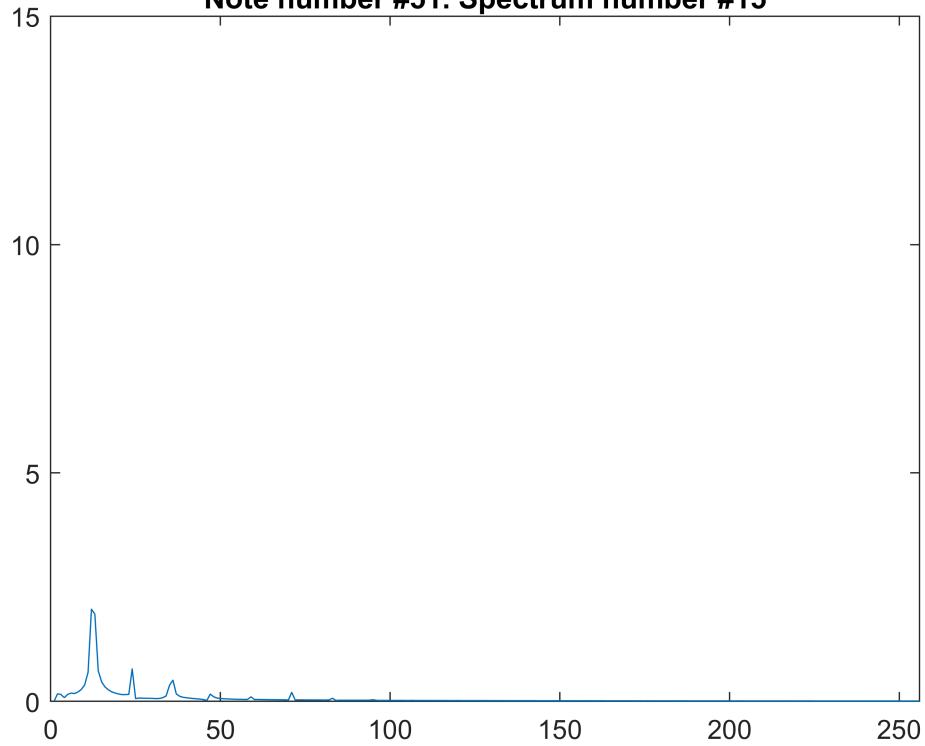
**Note number #51. Spectrum number #13**



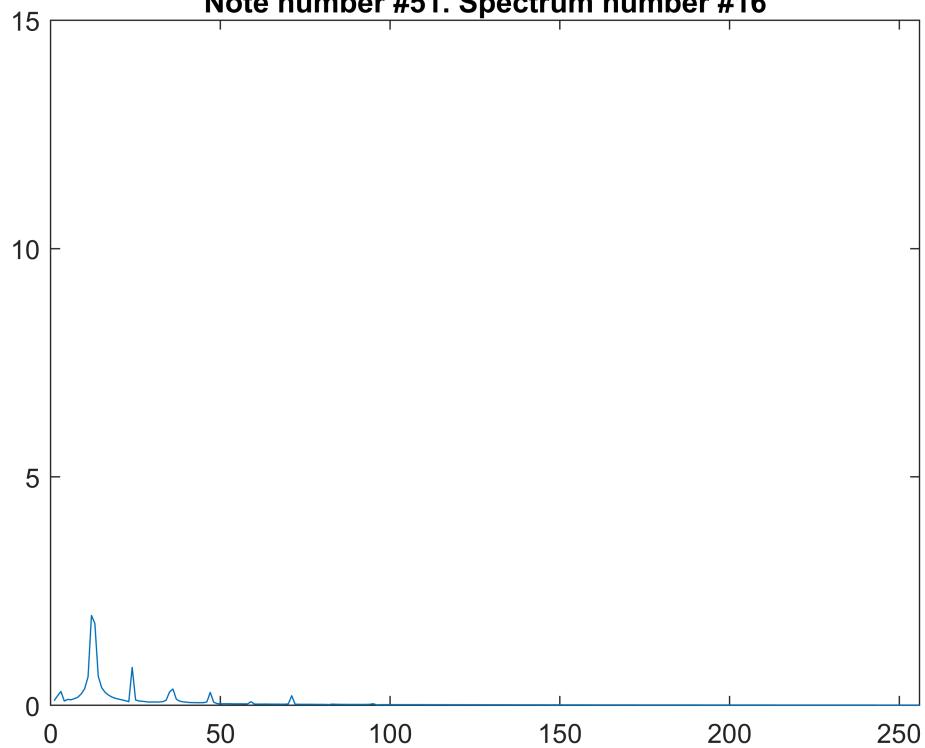
**Note number #51. Spectrum number #14**



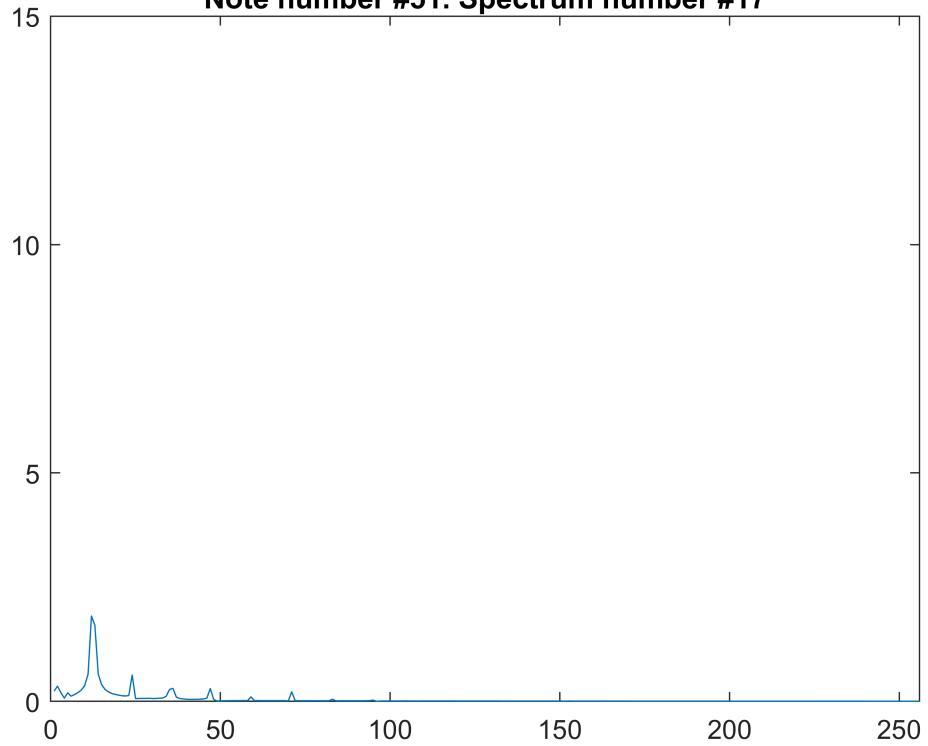
**Note number #51. Spectrum number #15**



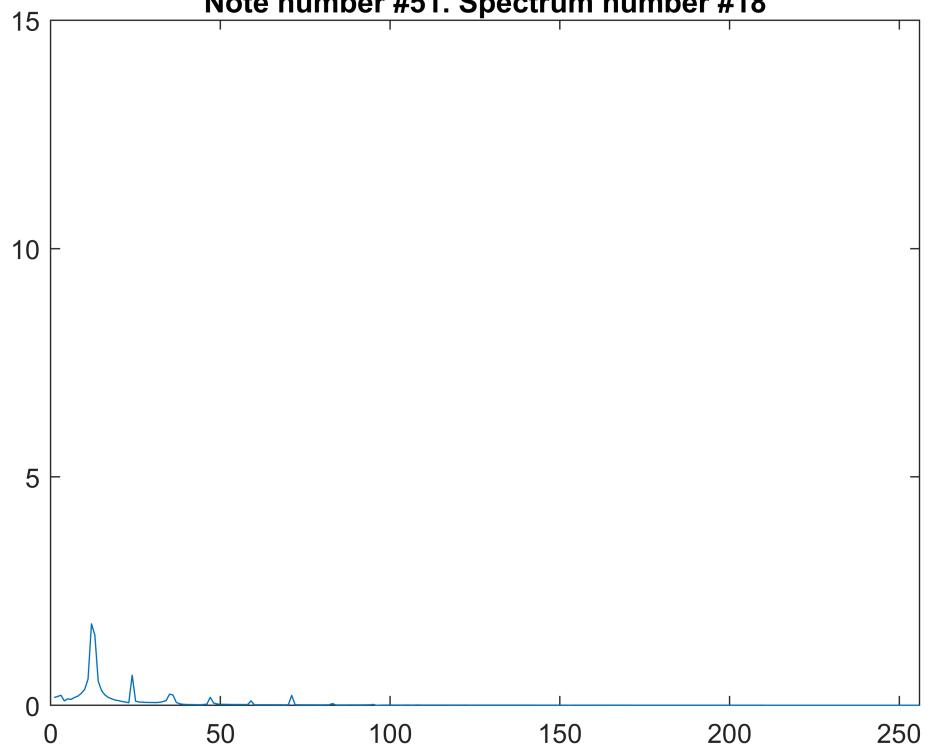
**Note number #51. Spectrum number #16**



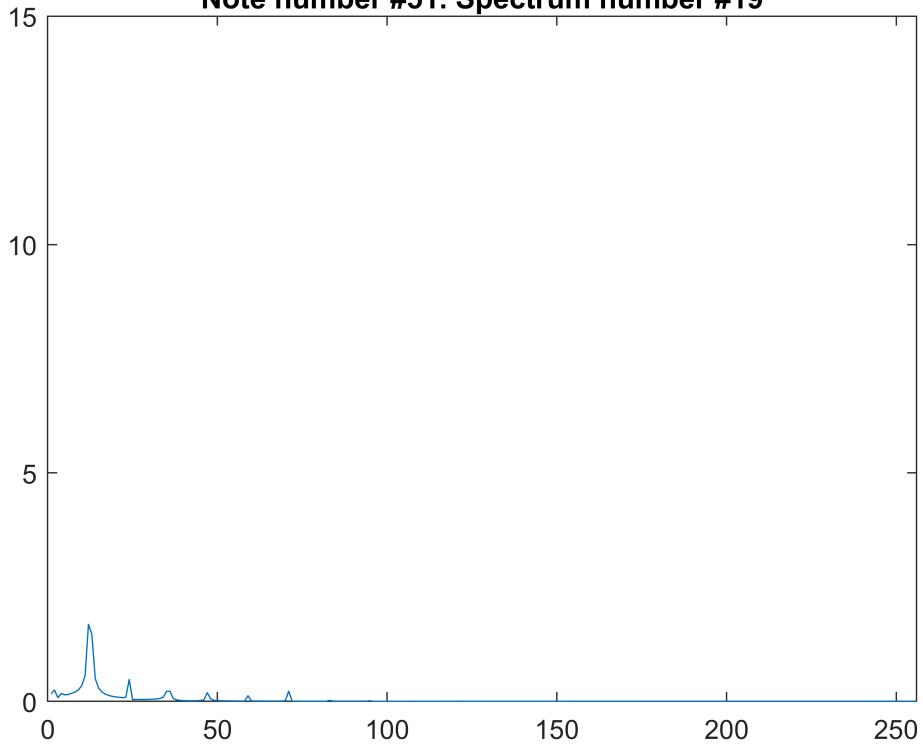
**Note number #51. Spectrum number #17**



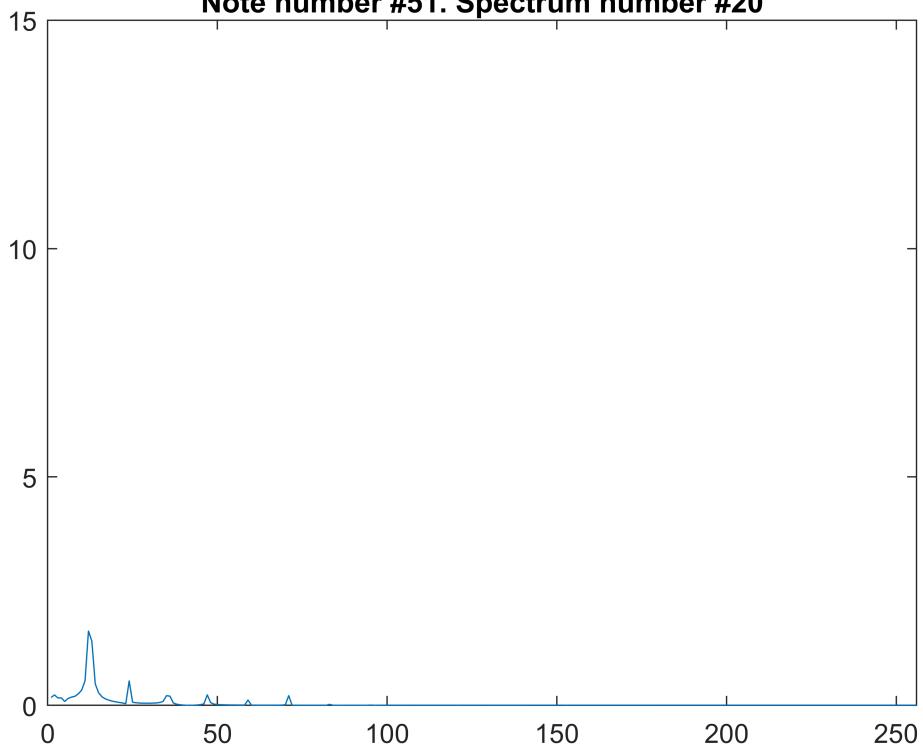
**Note number #51. Spectrum number #18**



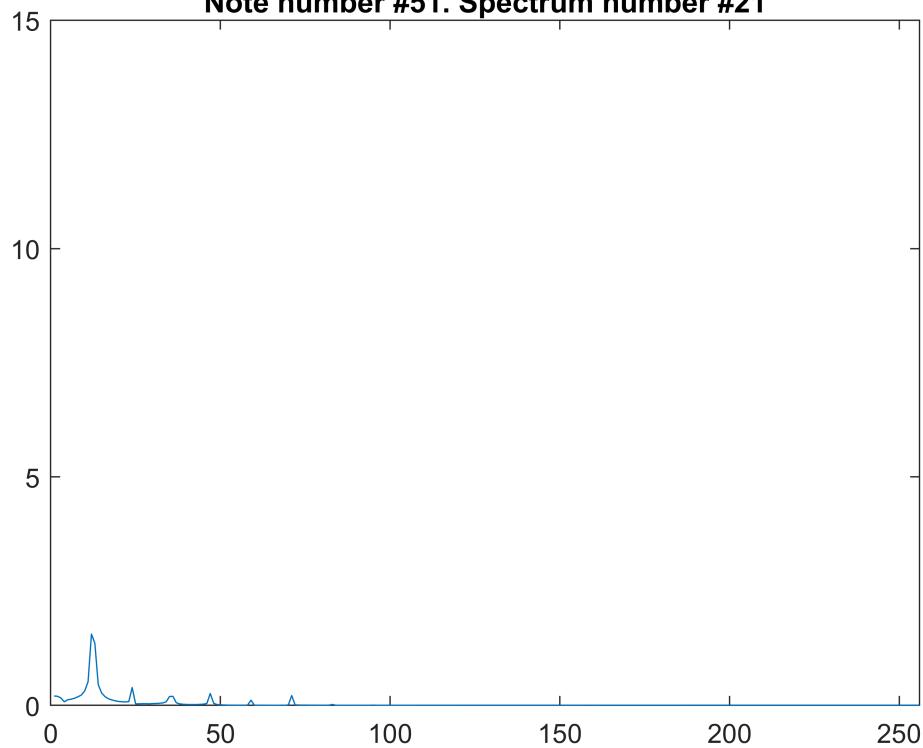
**Note number #51. Spectrum number #19**



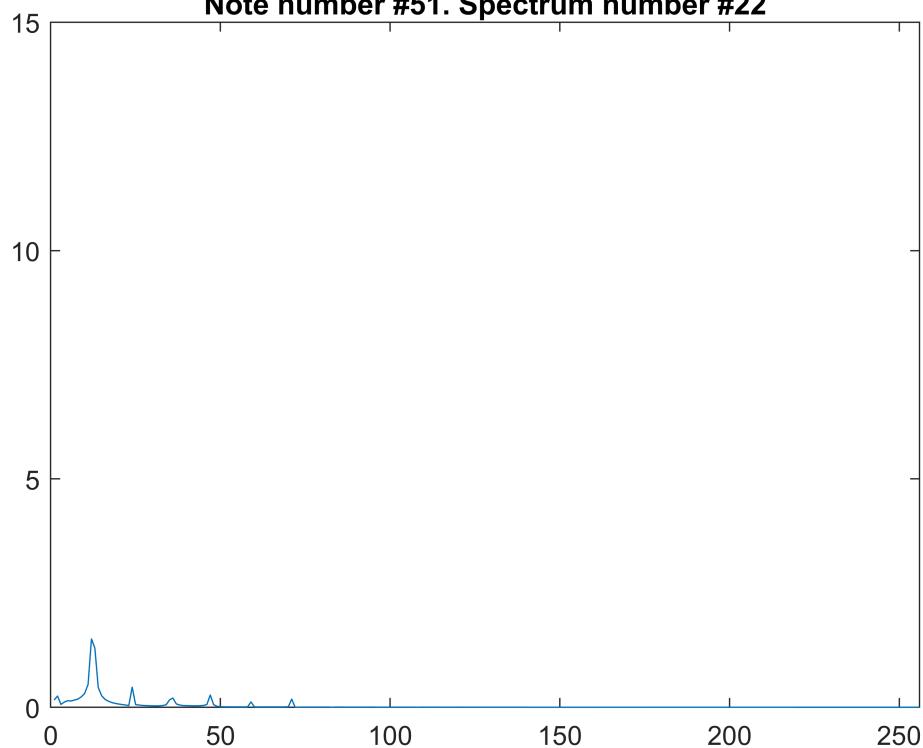
**Note number #51. Spectrum number #20**



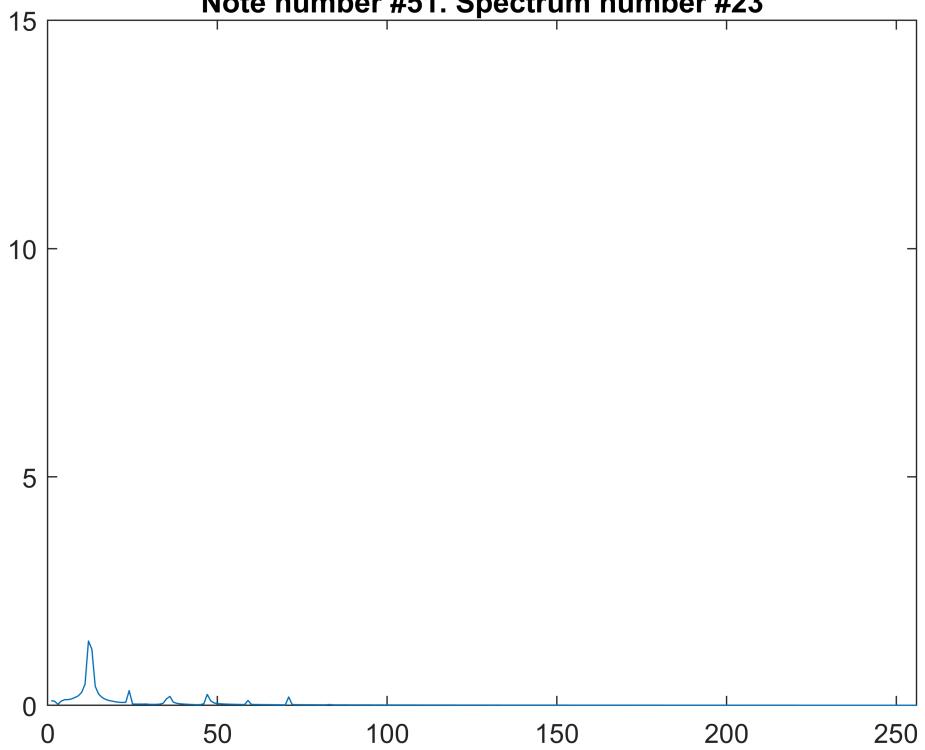
**Note number #51. Spectrum number #21**



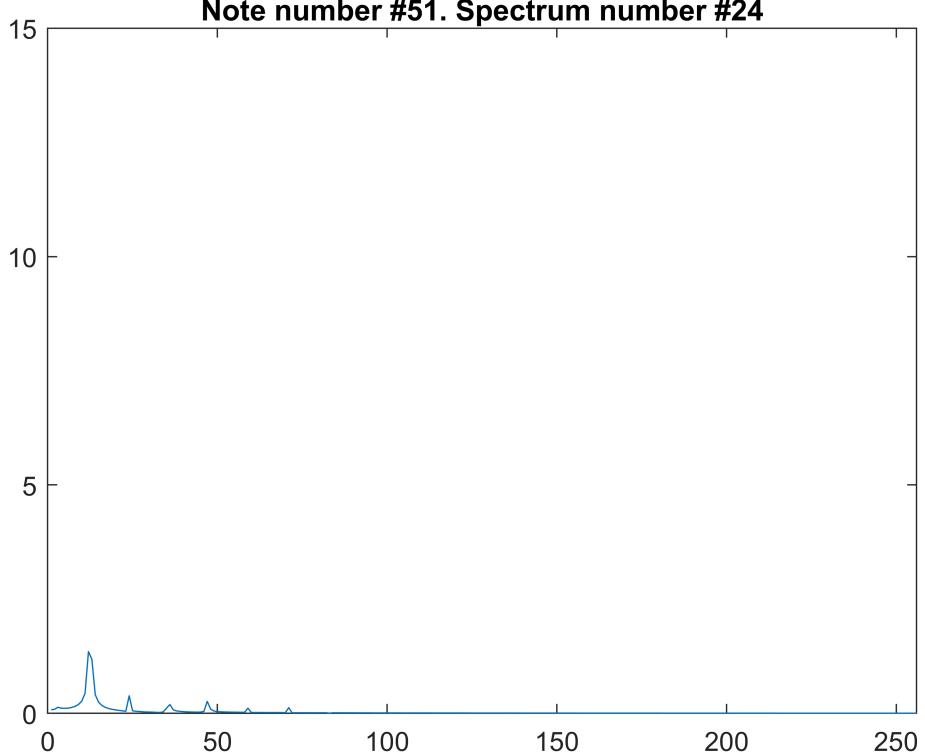
**Note number #51. Spectrum number #22**



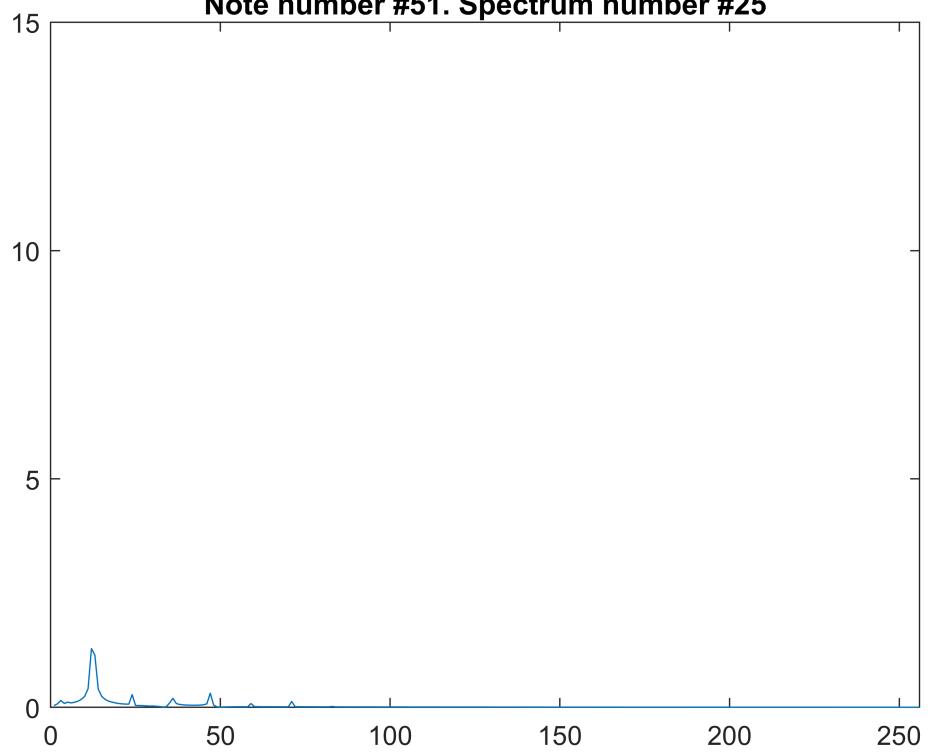
**Note number #51. Spectrum number #23**



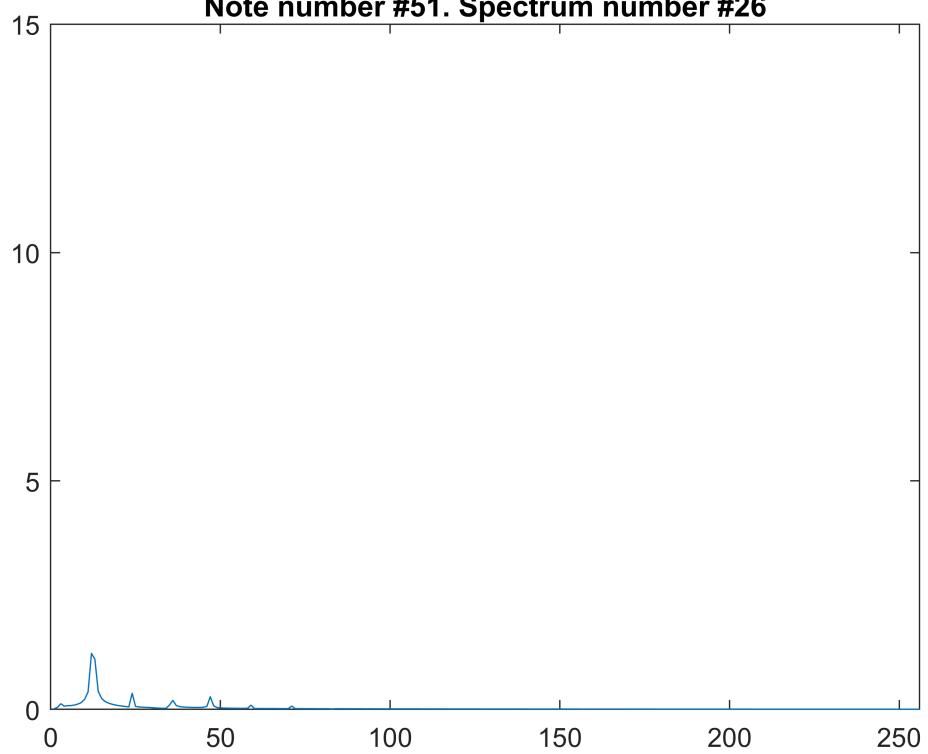
**Note number #51. Spectrum number #24**



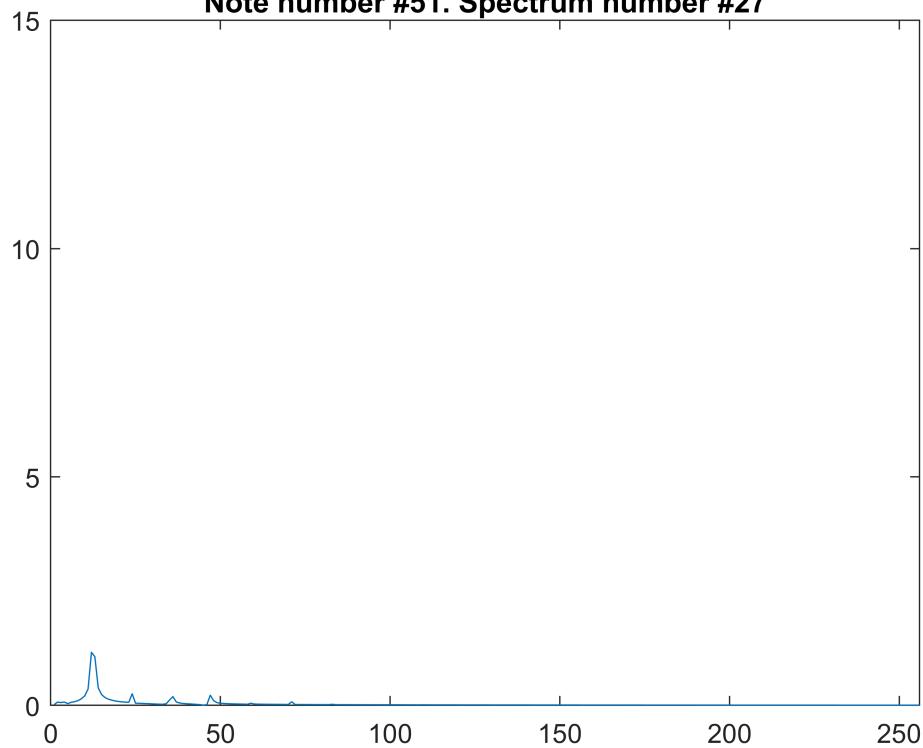
**Note number #51. Spectrum number #25**



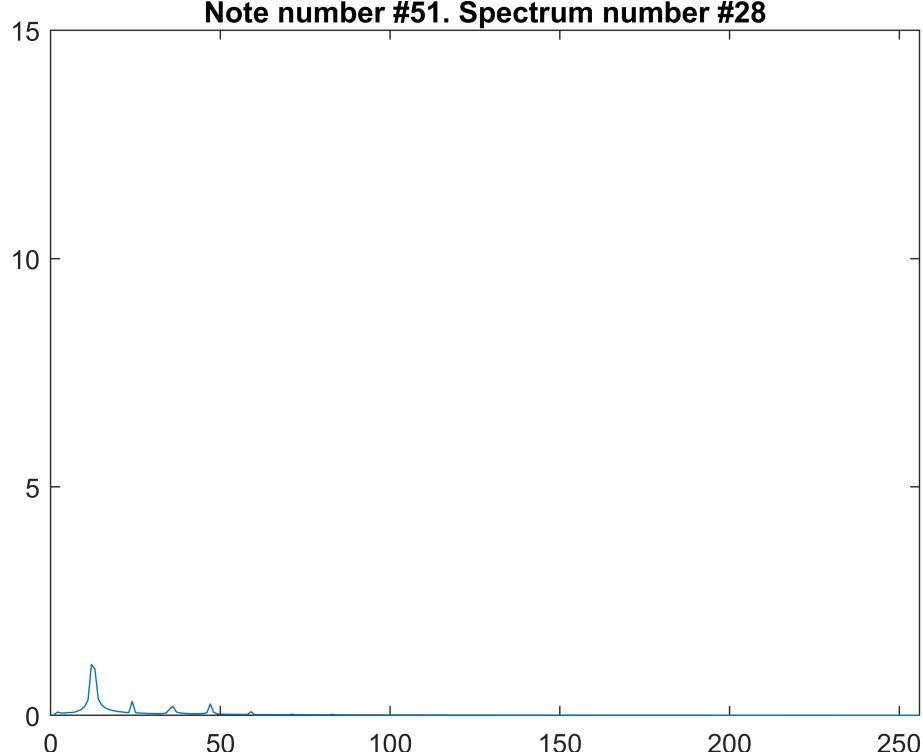
**Note number #51. Spectrum number #26**



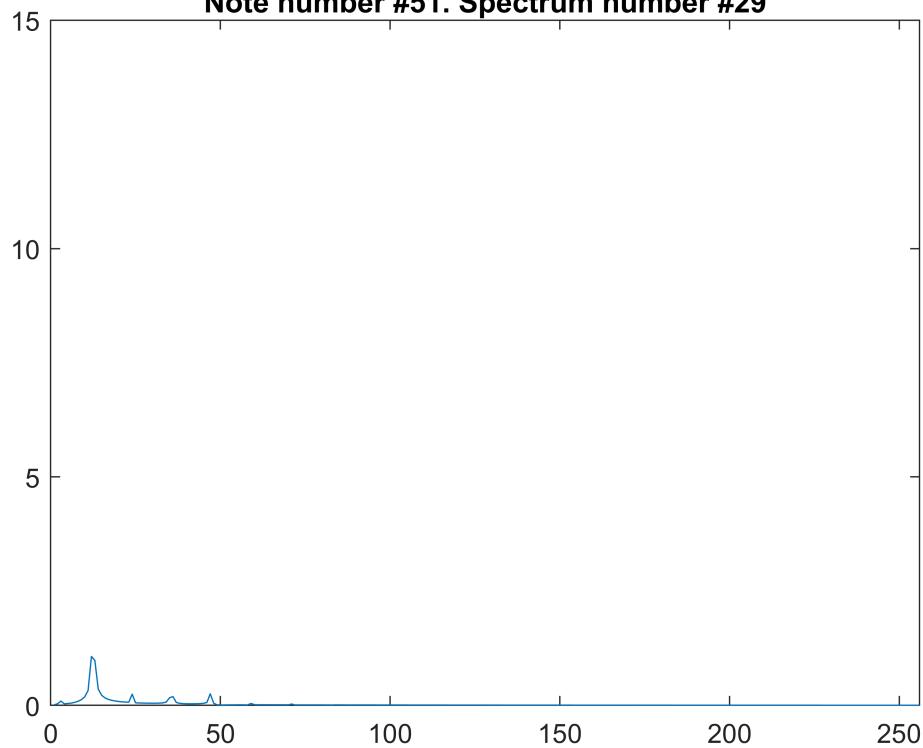
**Note number #51. Spectrum number #27**



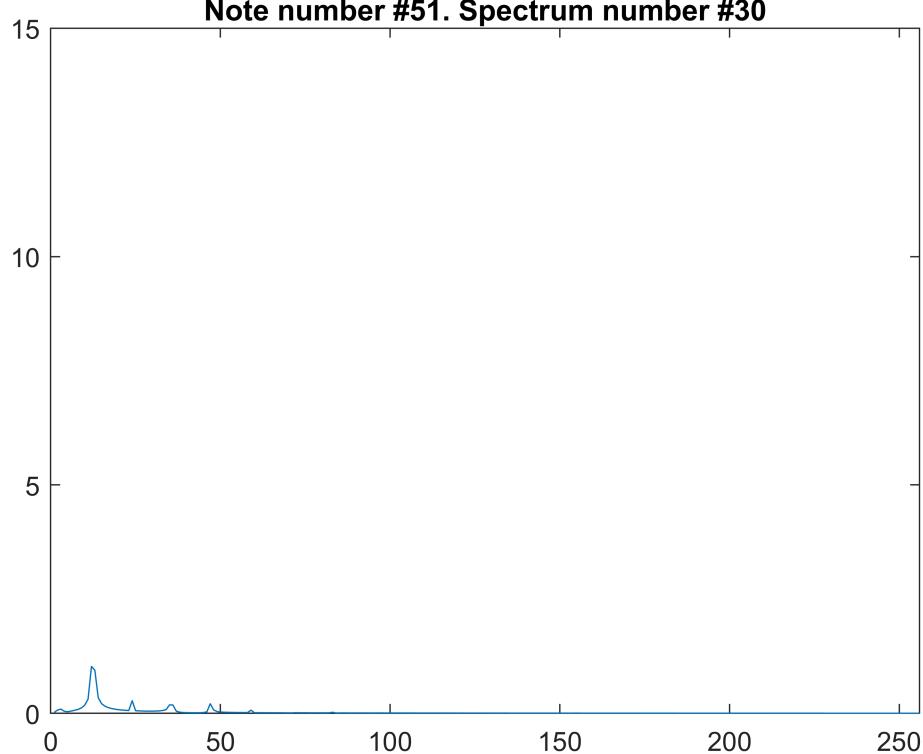
**Note number #51. Spectrum number #28**



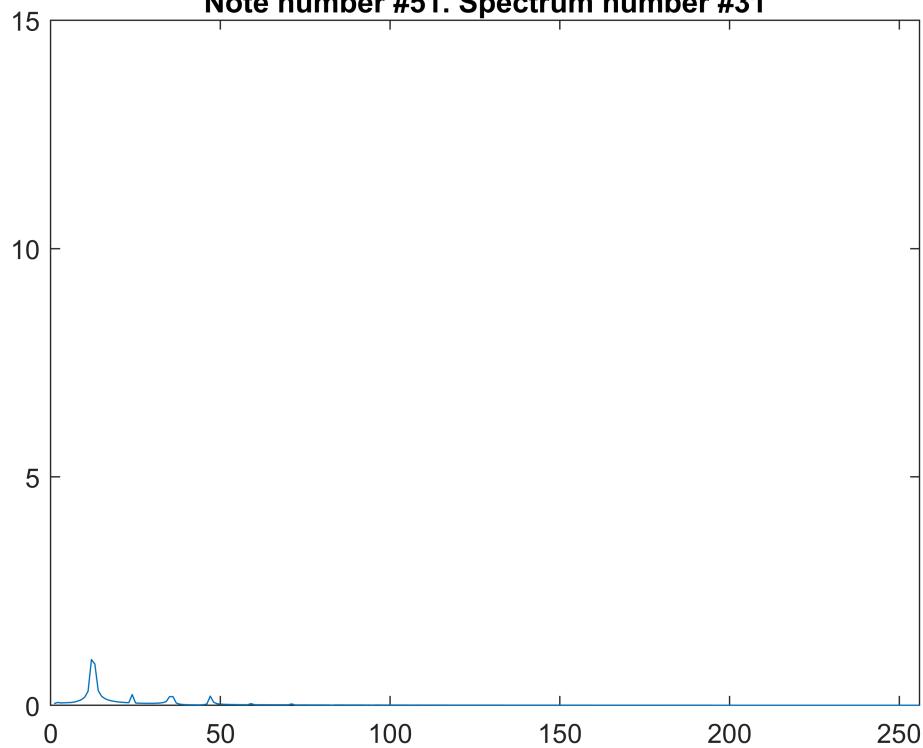
**Note number #51. Spectrum number #29**



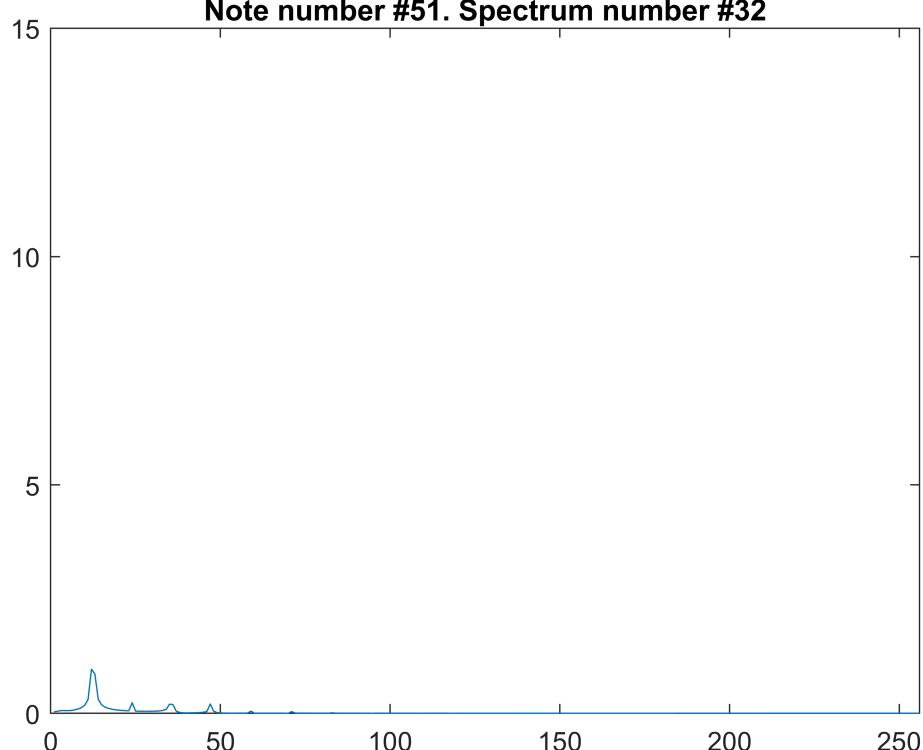
**Note number #51. Spectrum number #30**



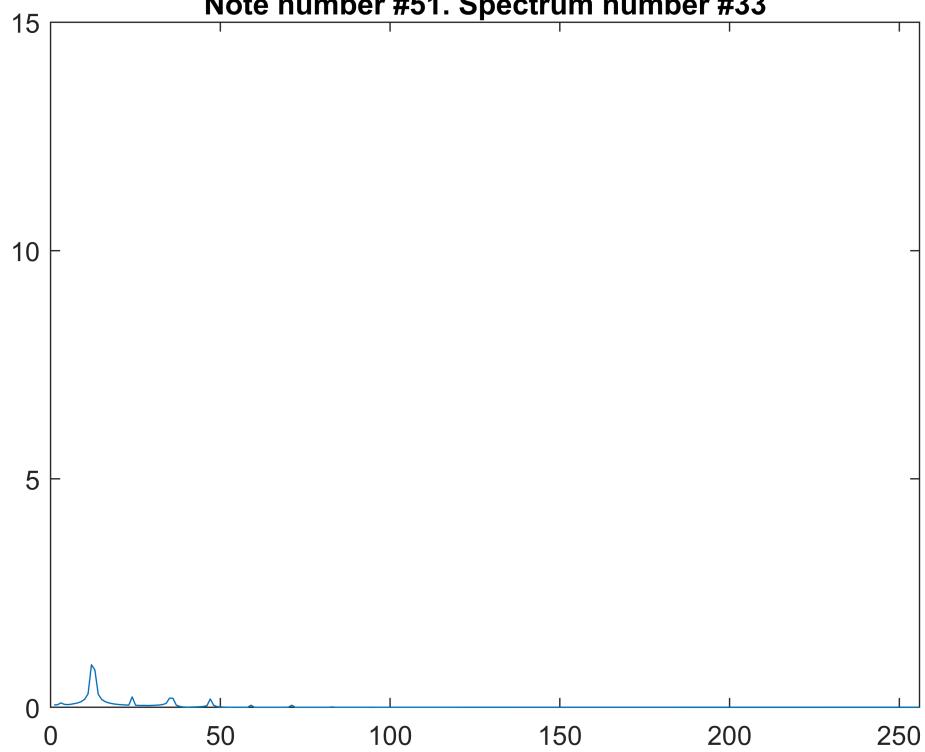
**Note number #51. Spectrum number #31**



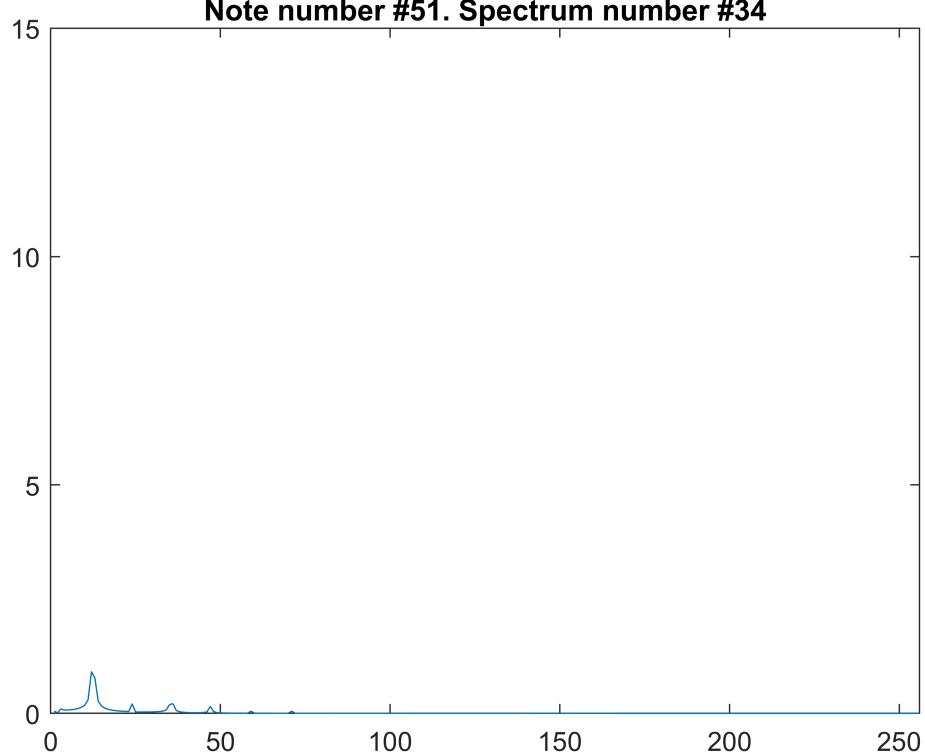
**Note number #51. Spectrum number #32**



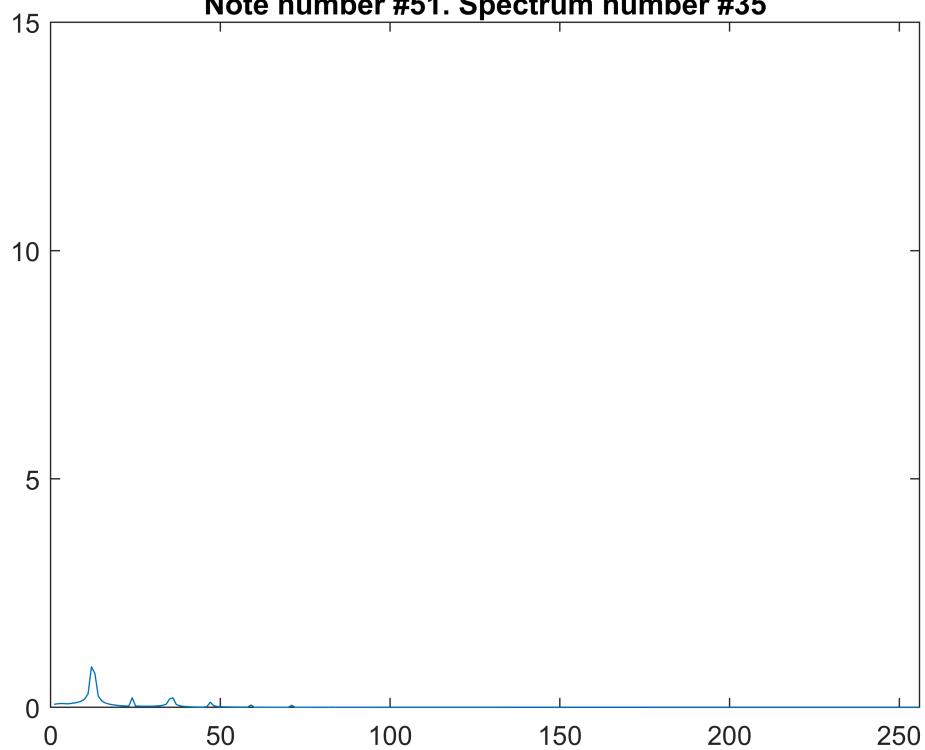
**Note number #51. Spectrum number #33**



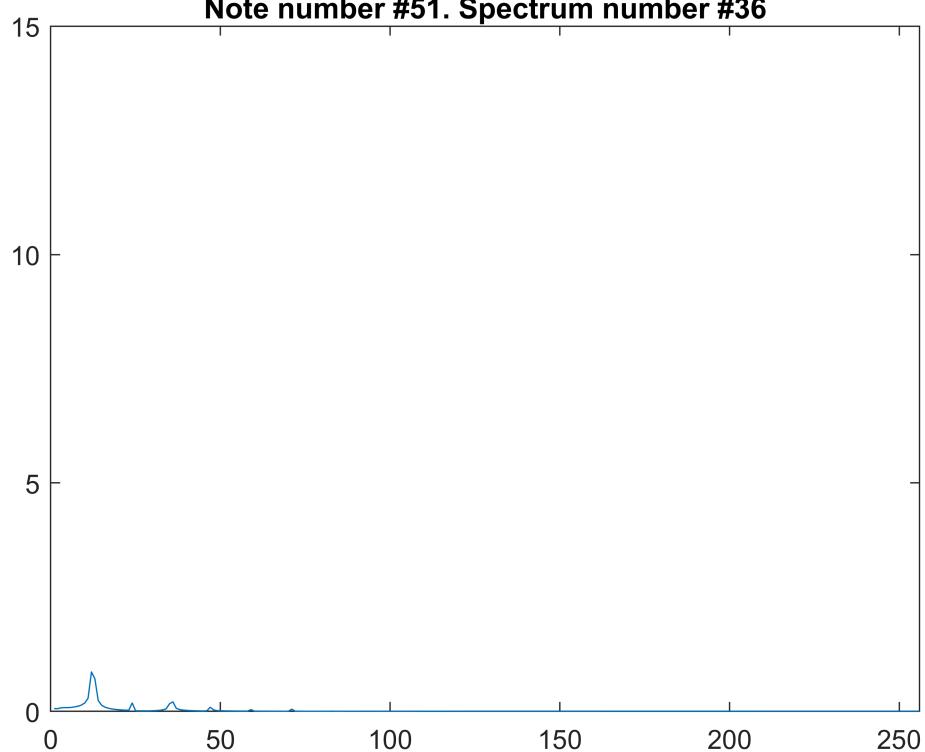
**Note number #51. Spectrum number #34**



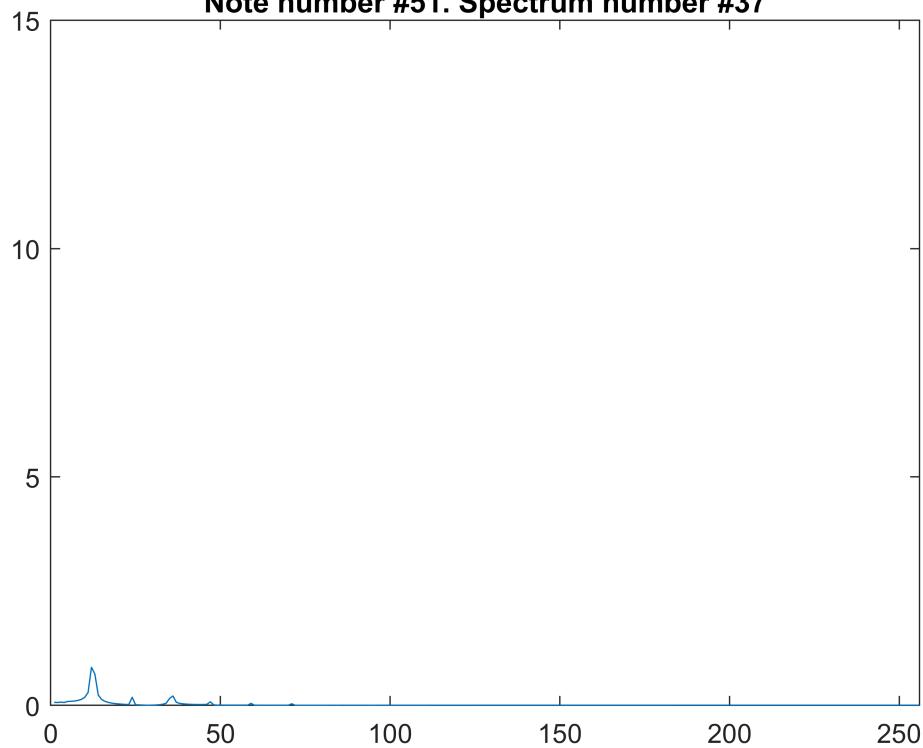
**Note number #51. Spectrum number #35**



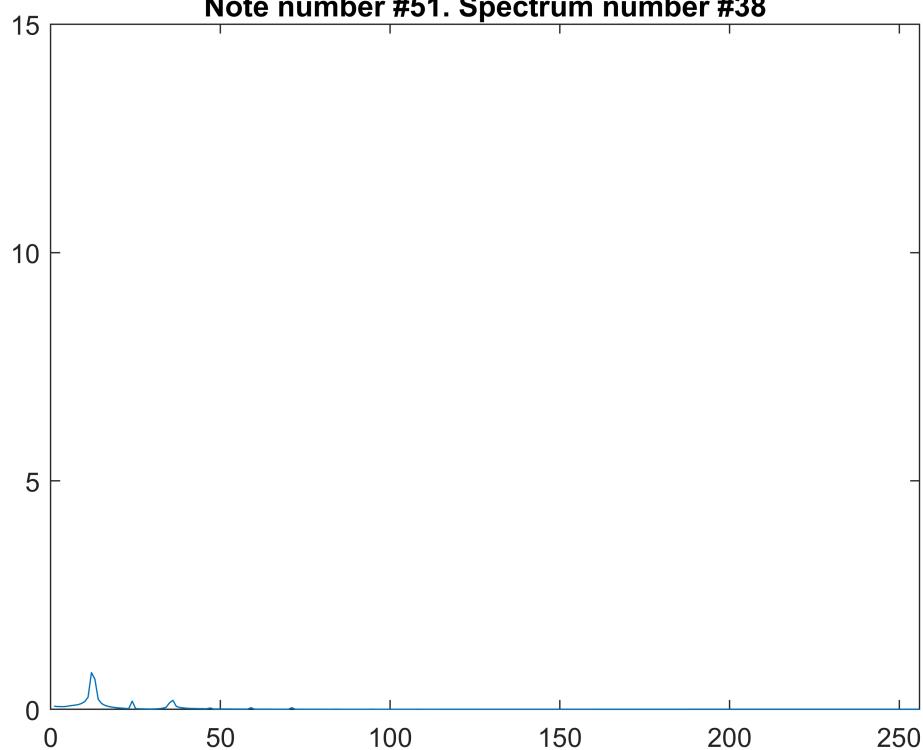
**Note number #51. Spectrum number #36**



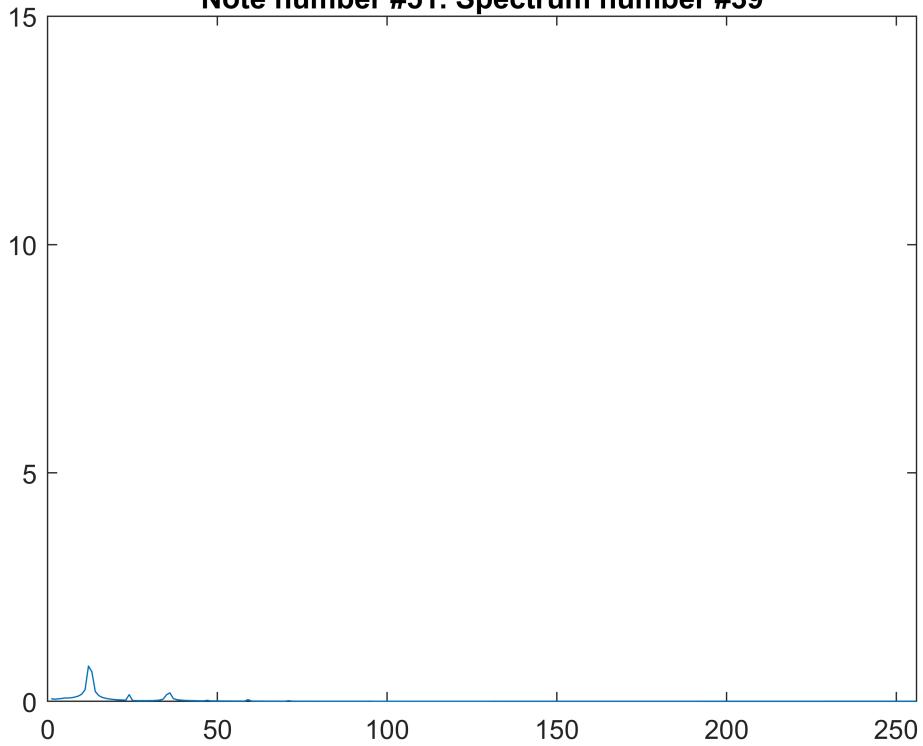
**Note number #51. Spectrum number #37**



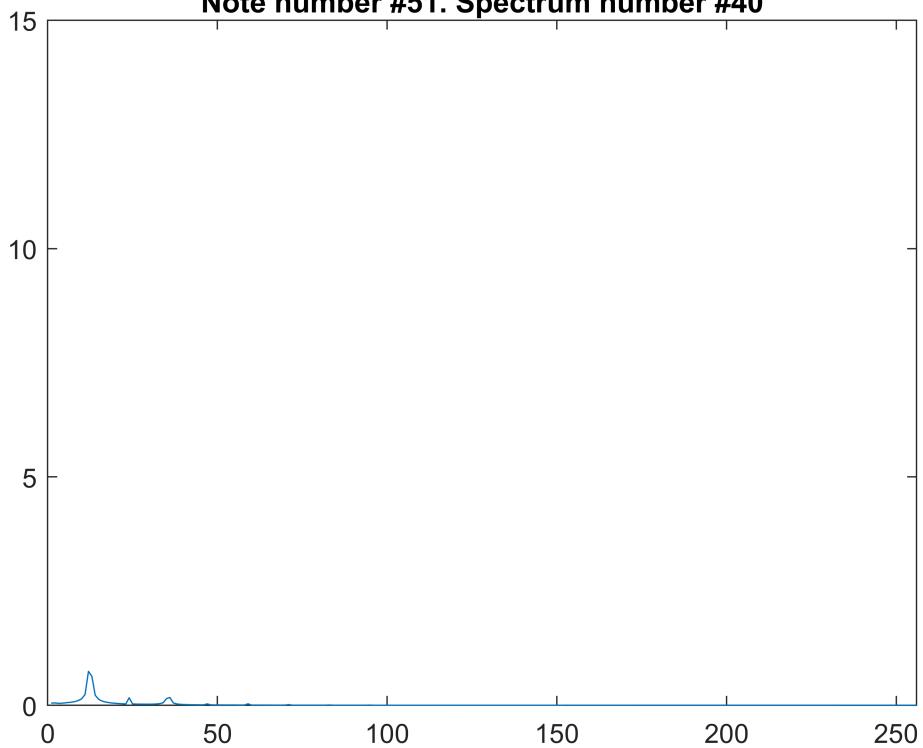
**Note number #51. Spectrum number #38**



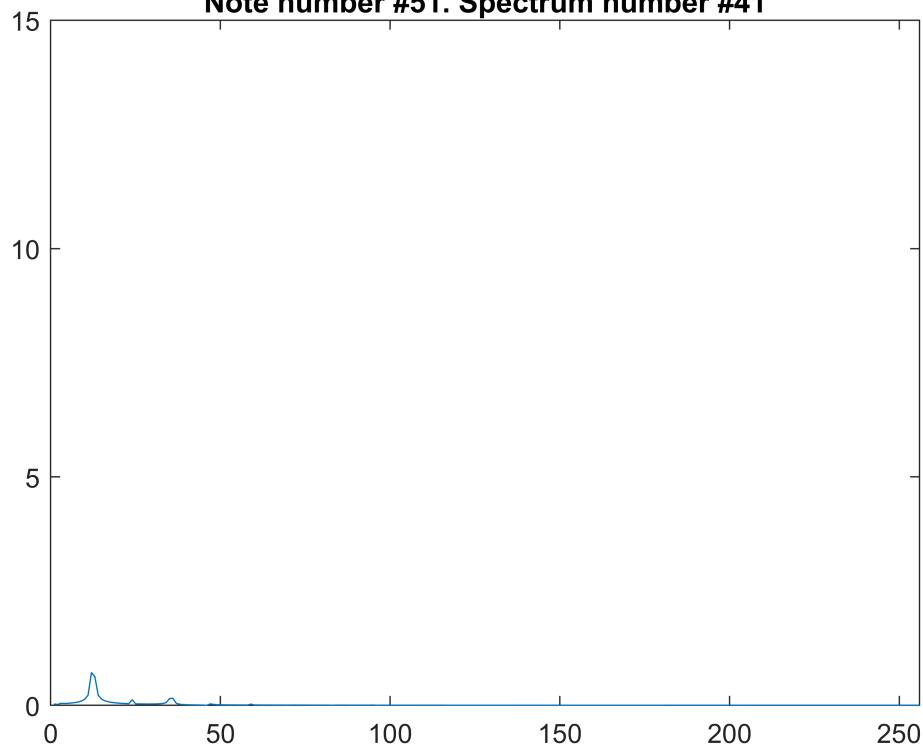
**Note number #51. Spectrum number #39**



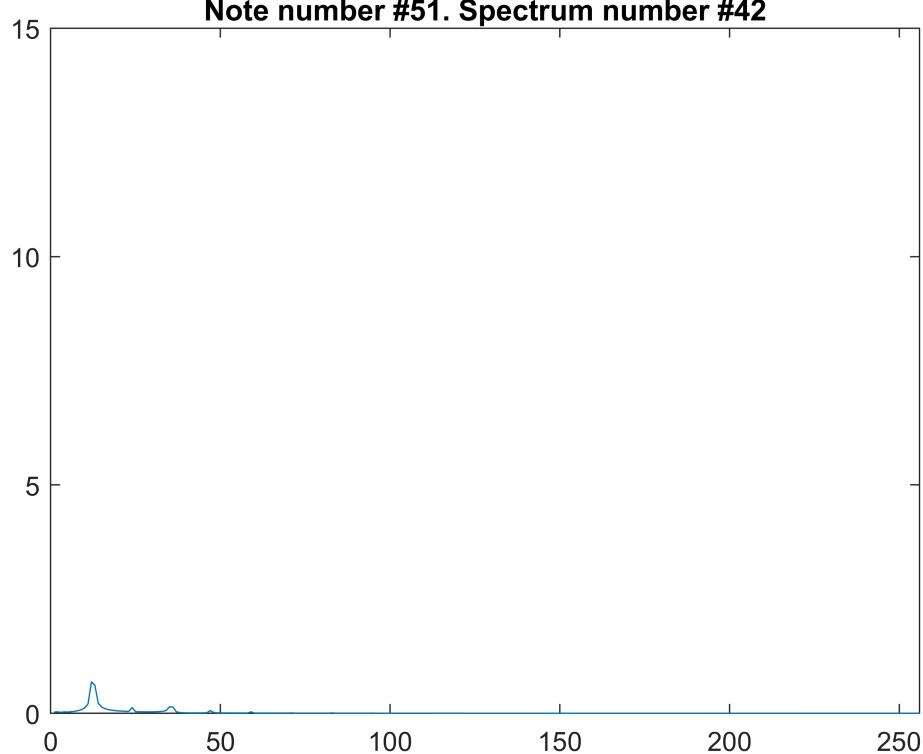
**Note number #51. Spectrum number #40**



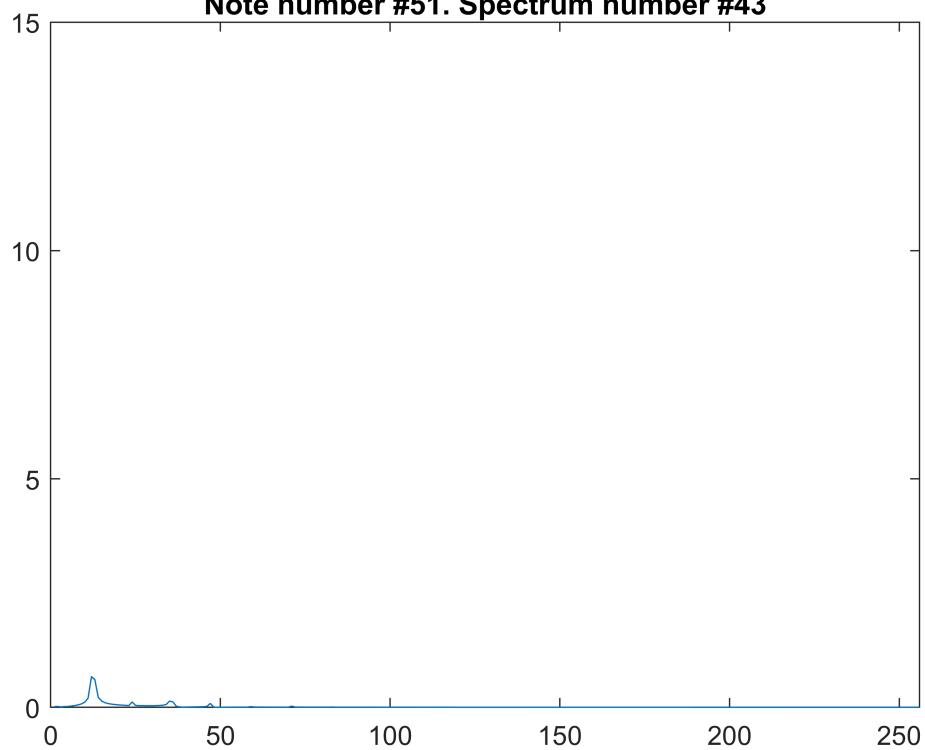
**Note number #51. Spectrum number #41**



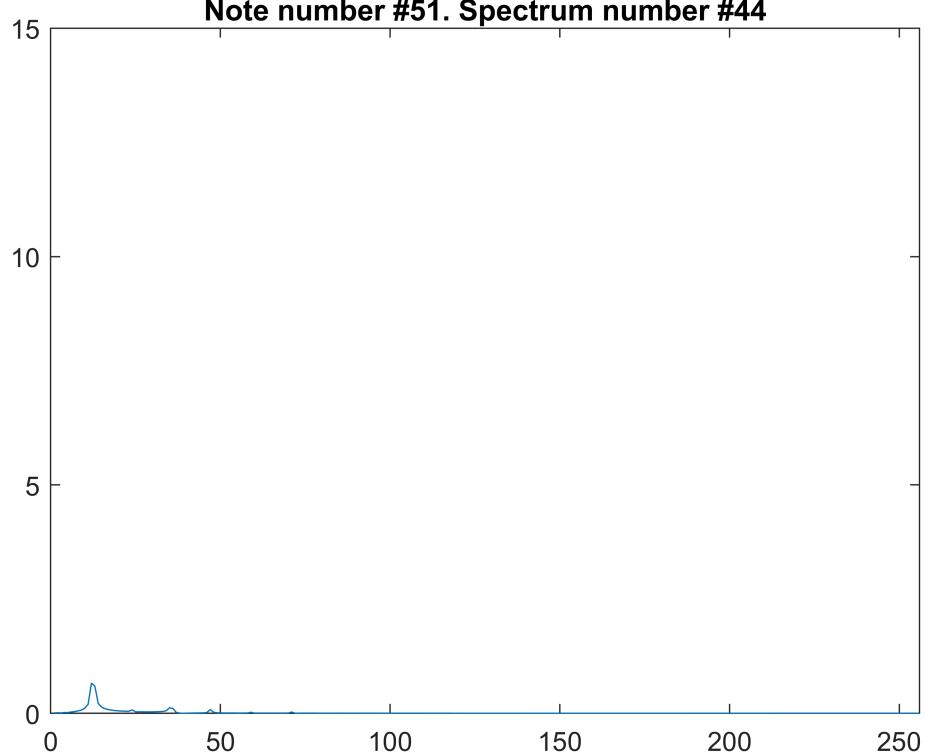
**Note number #51. Spectrum number #42**



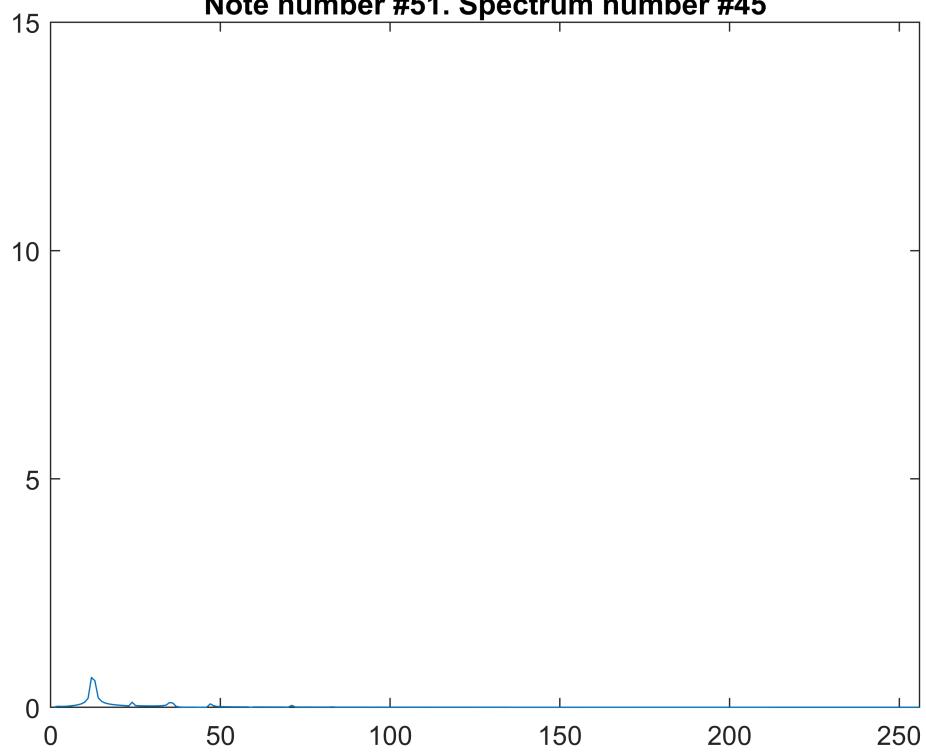
**Note number #51. Spectrum number #43**



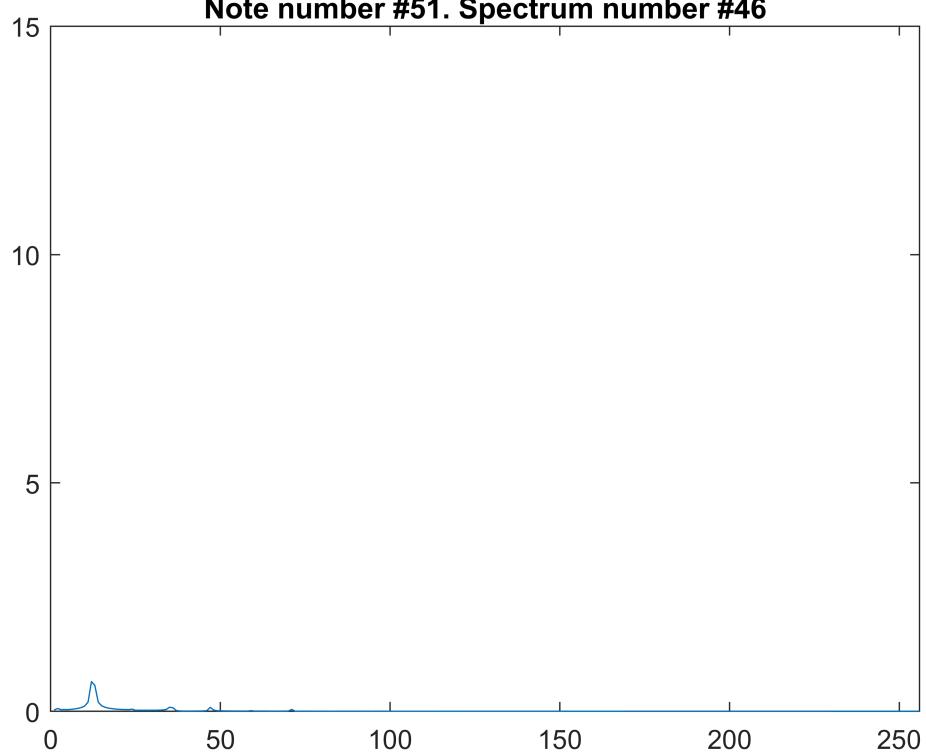
**Note number #51. Spectrum number #44**



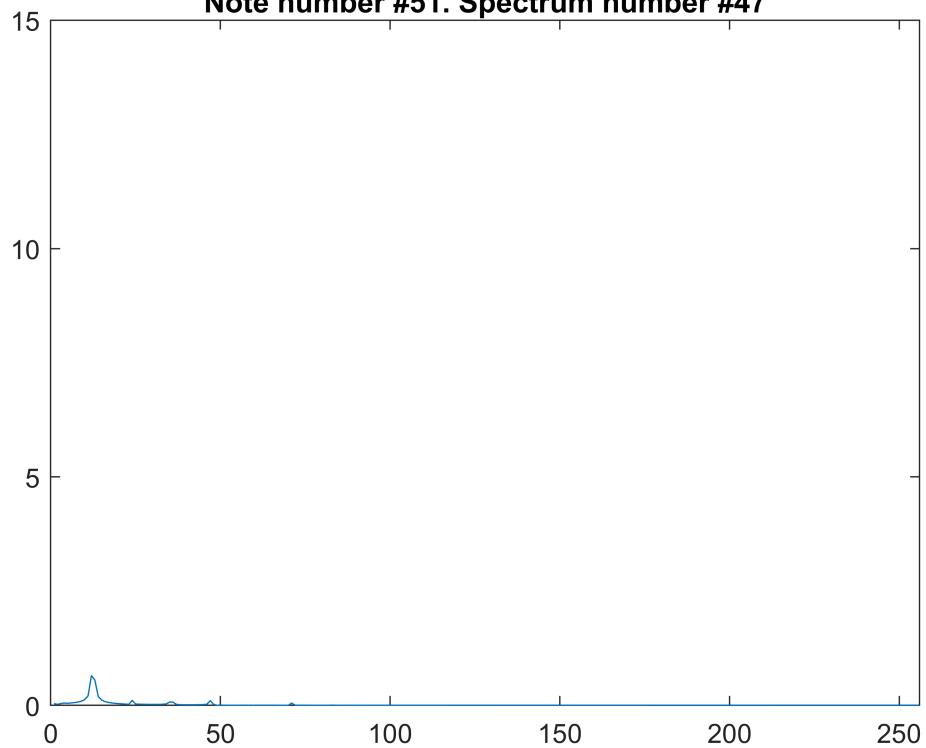
**Note number #51. Spectrum number #45**



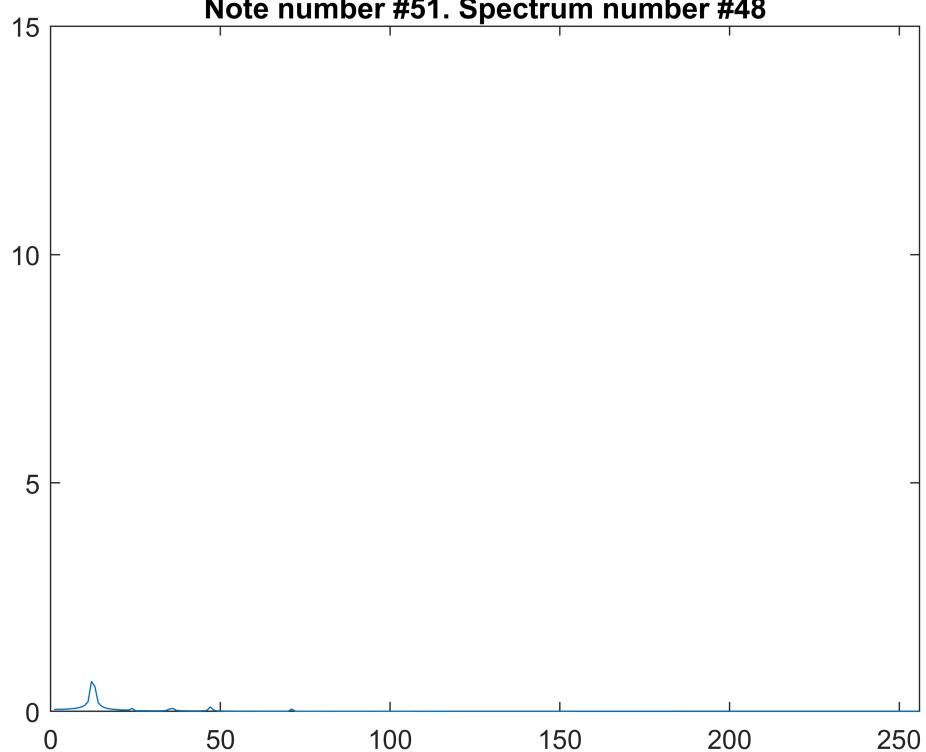
**Note number #51. Spectrum number #46**



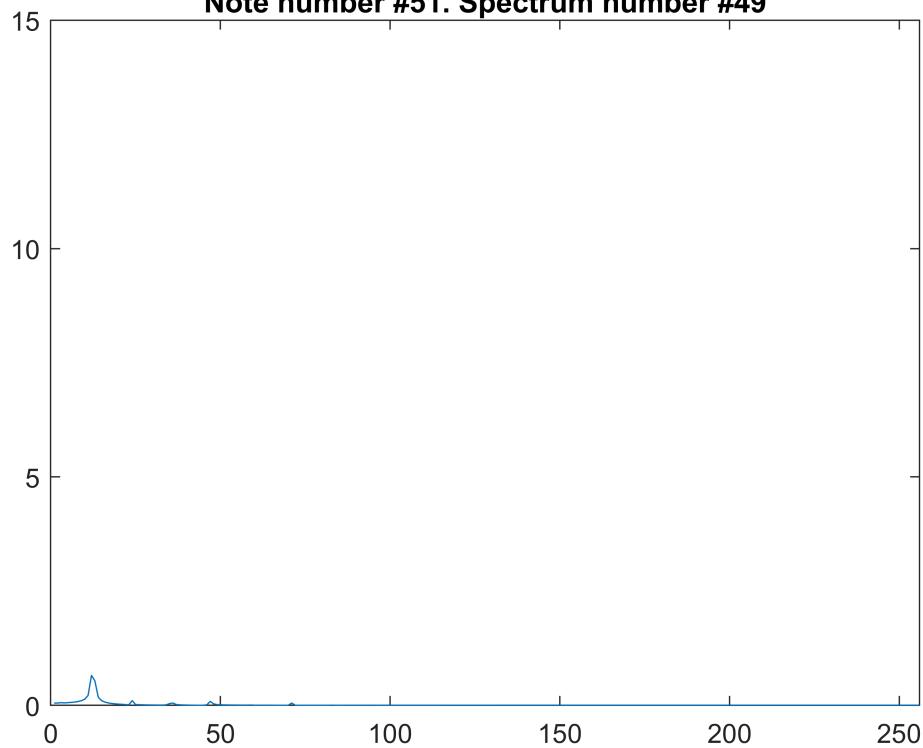
**Note number #51. Spectrum number #47**



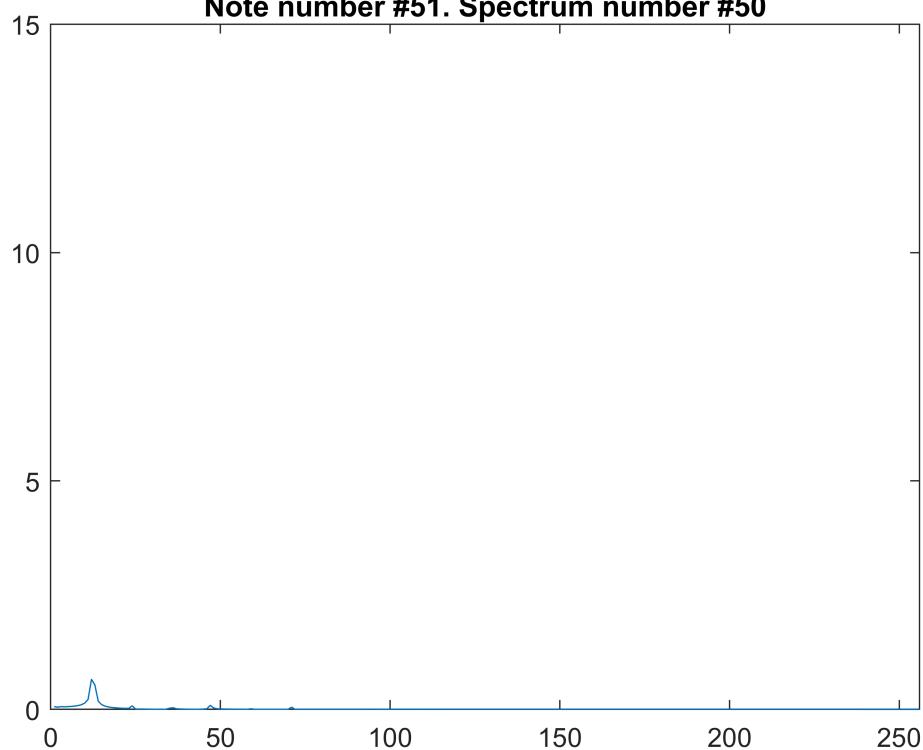
**Note number #51. Spectrum number #48**



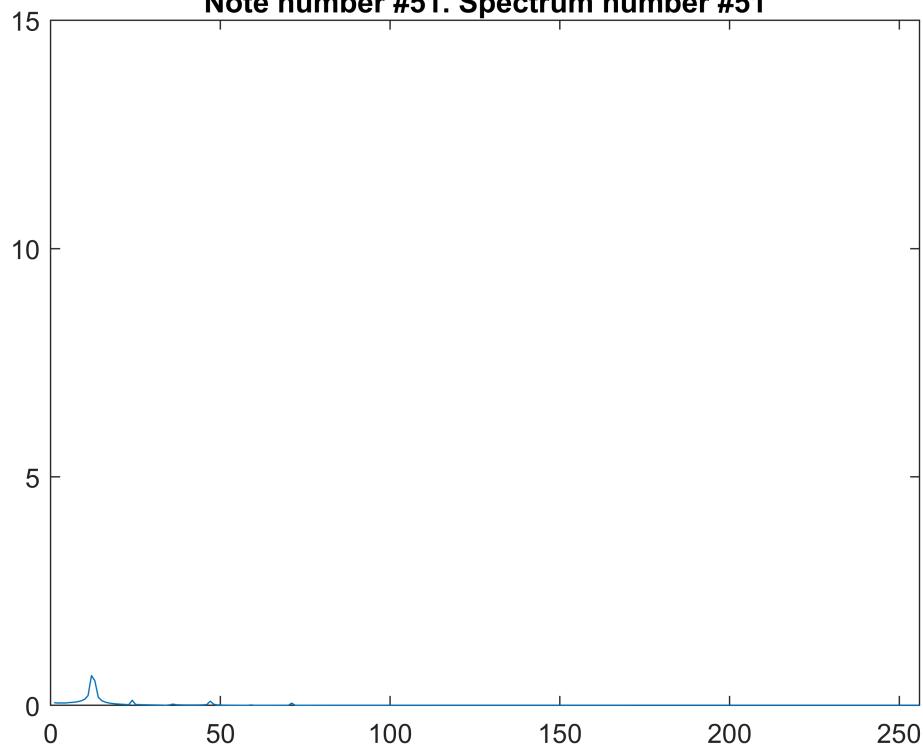
**Note number #51. Spectrum number #49**



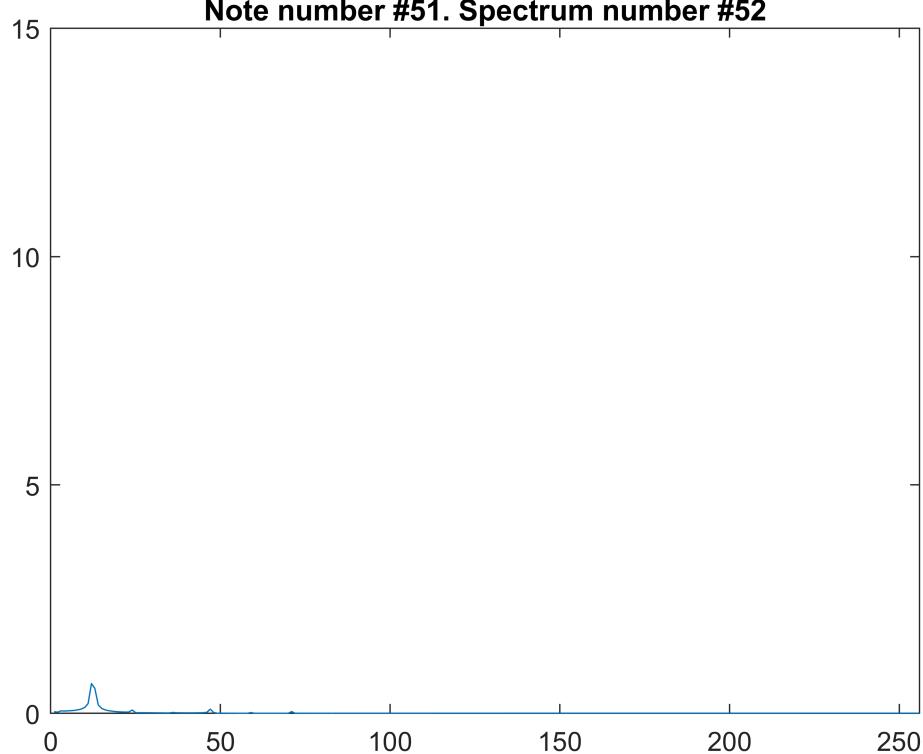
**Note number #51. Spectrum number #50**



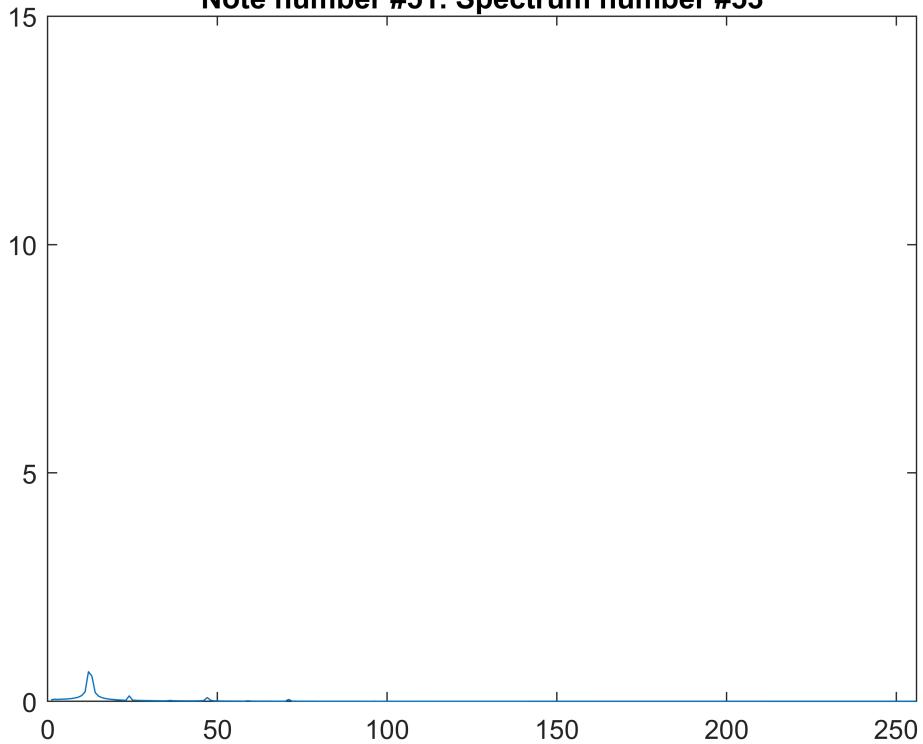
**Note number #51. Spectrum number #51**



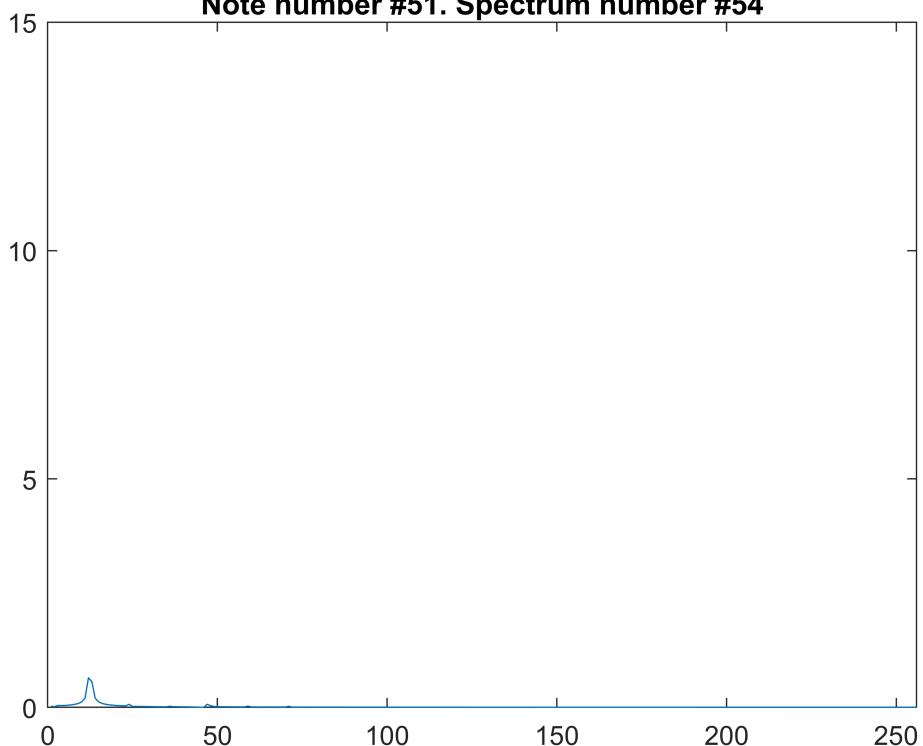
**Note number #51. Spectrum number #52**



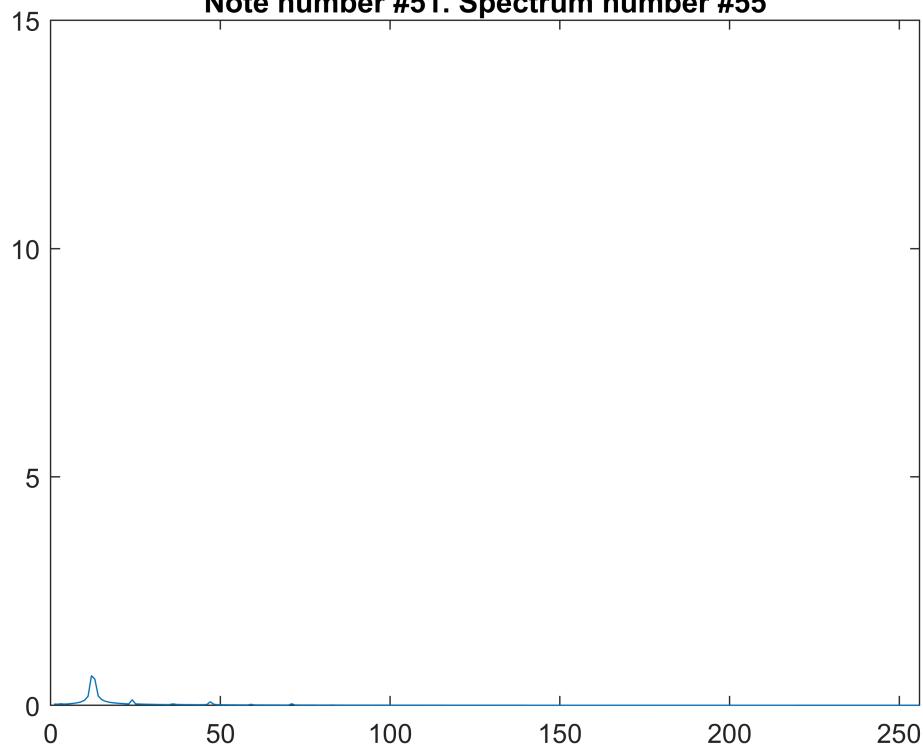
**Note number #51. Spectrum number #53**



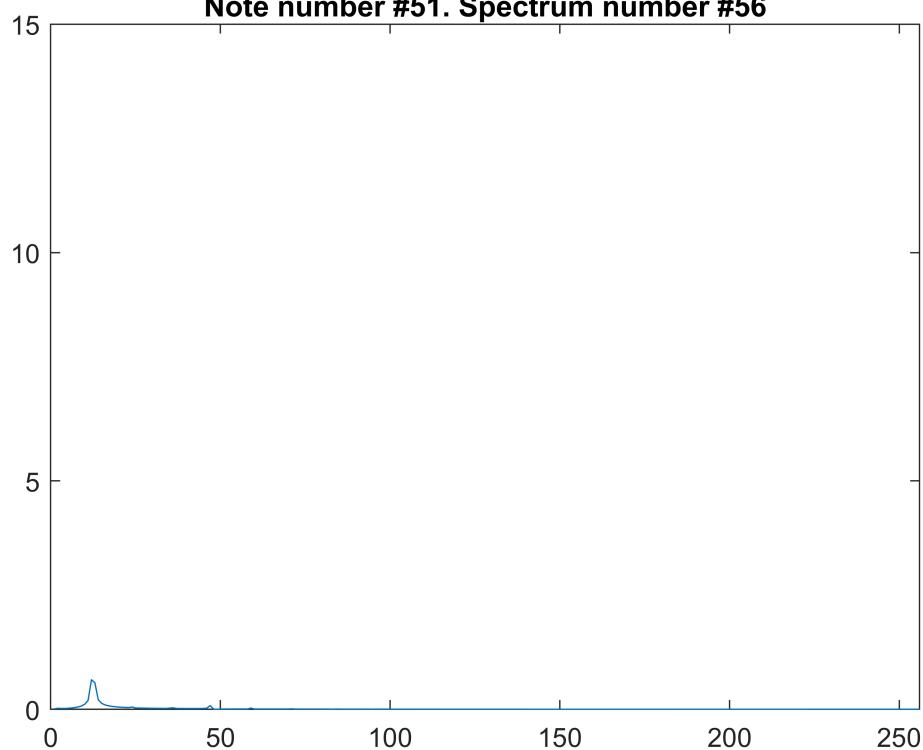
**Note number #51. Spectrum number #54**



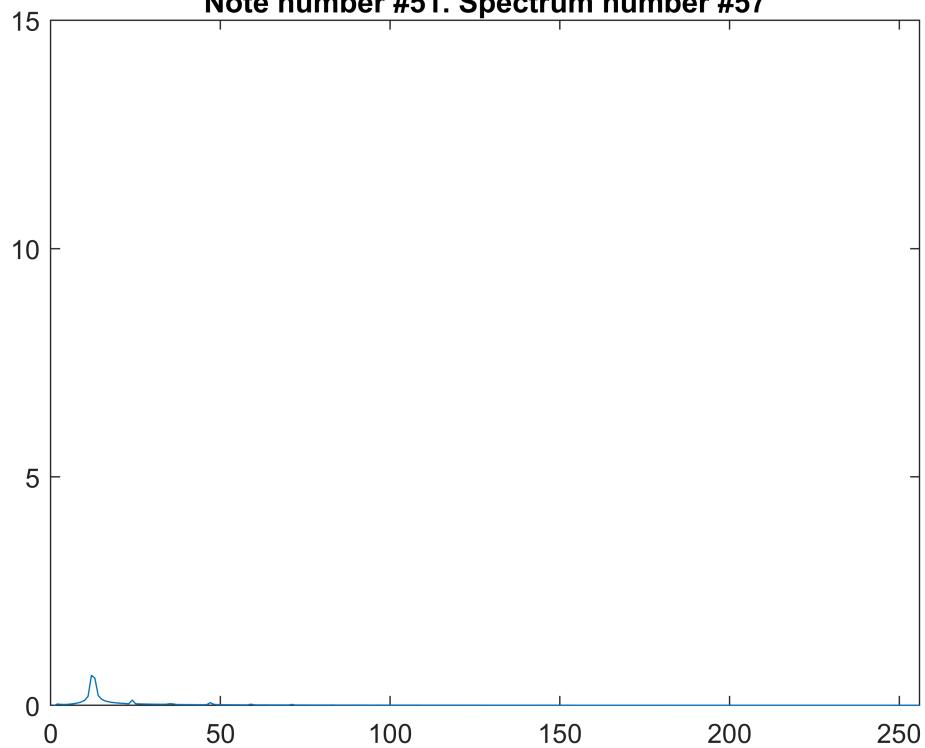
**Note number #51. Spectrum number #55**



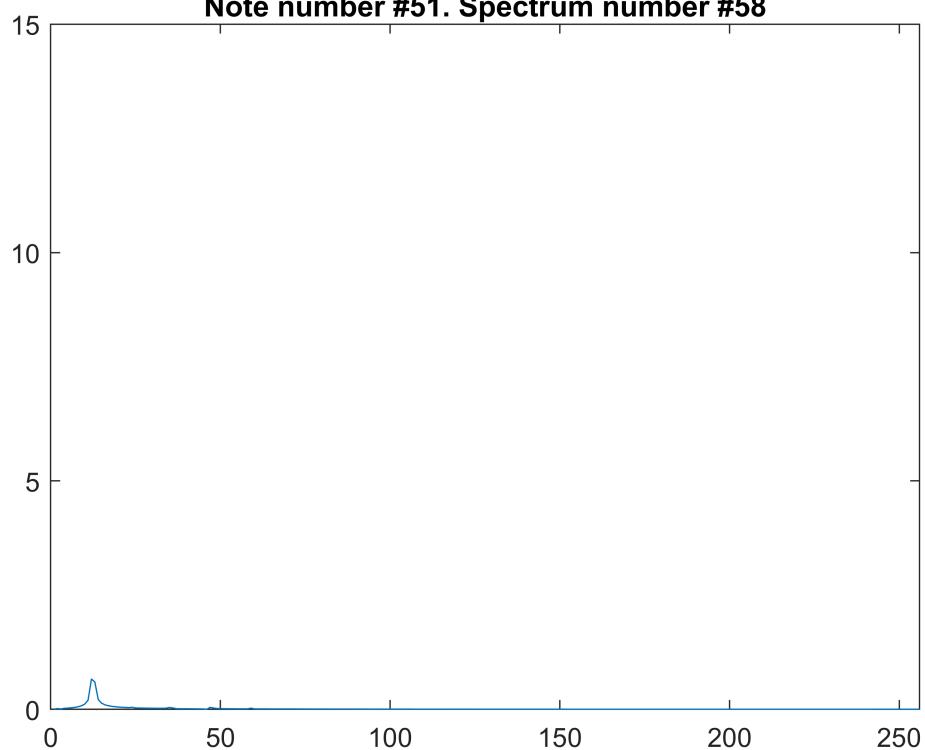
**Note number #51. Spectrum number #56**



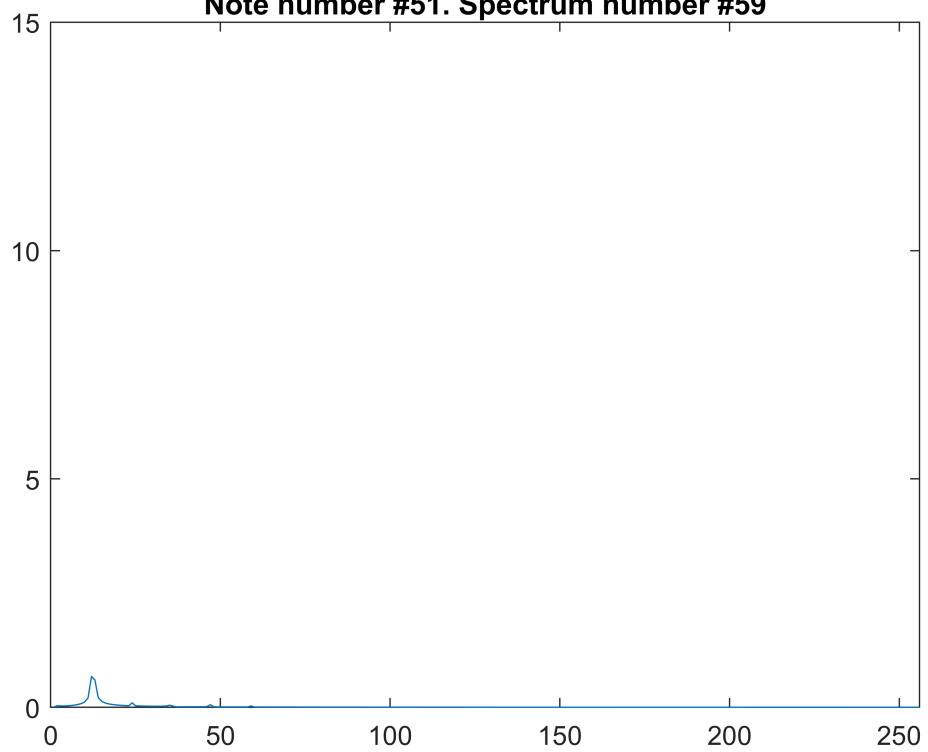
**Note number #51. Spectrum number #57**



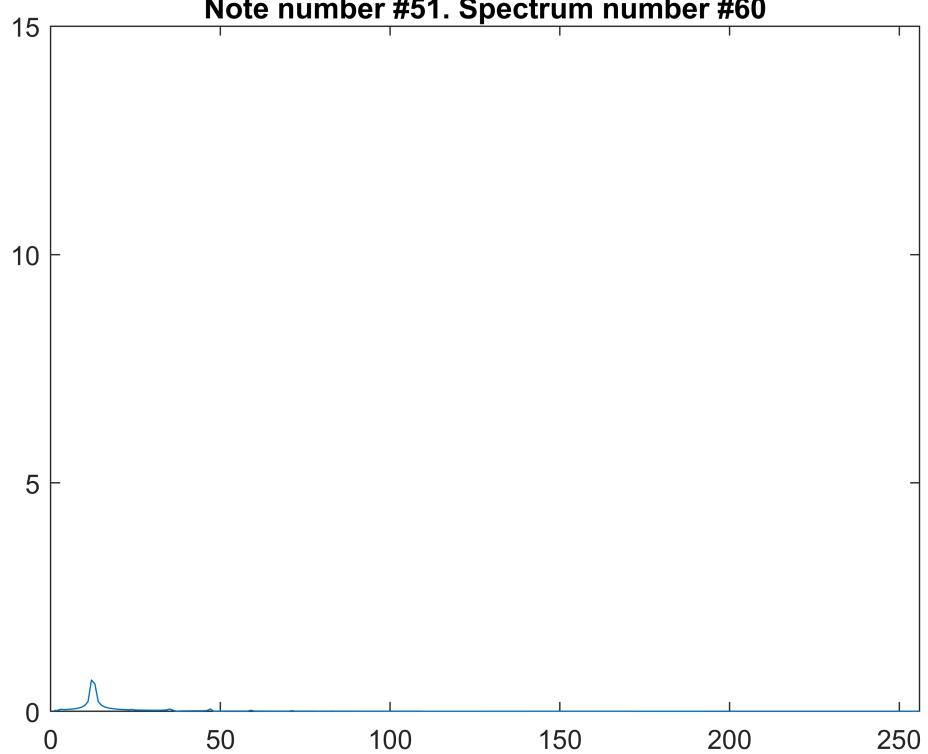
**Note number #51. Spectrum number #58**



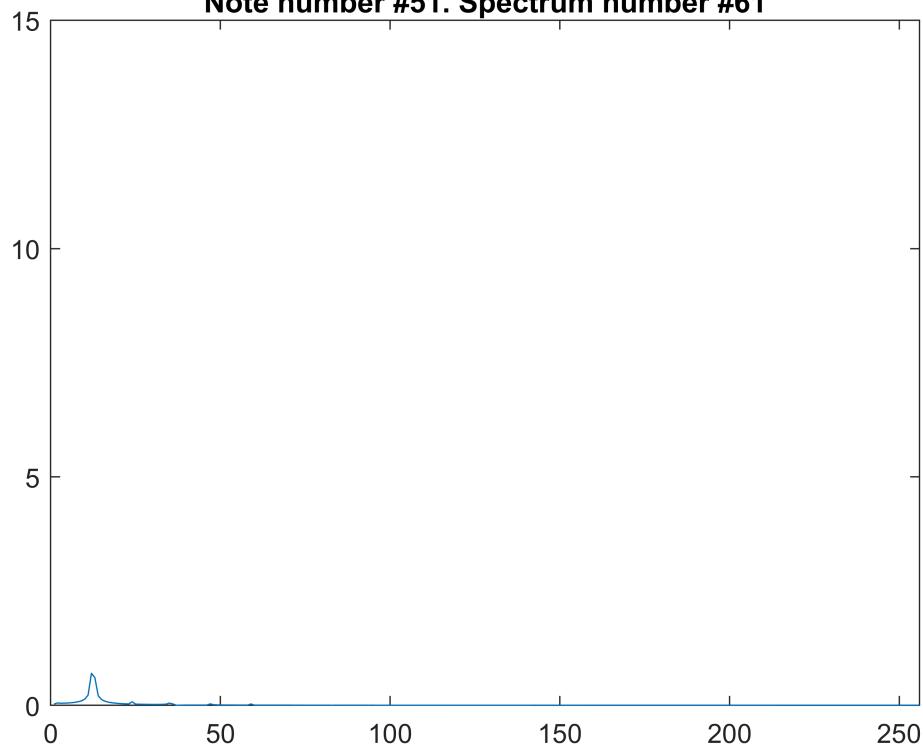
**Note number #51. Spectrum number #59**



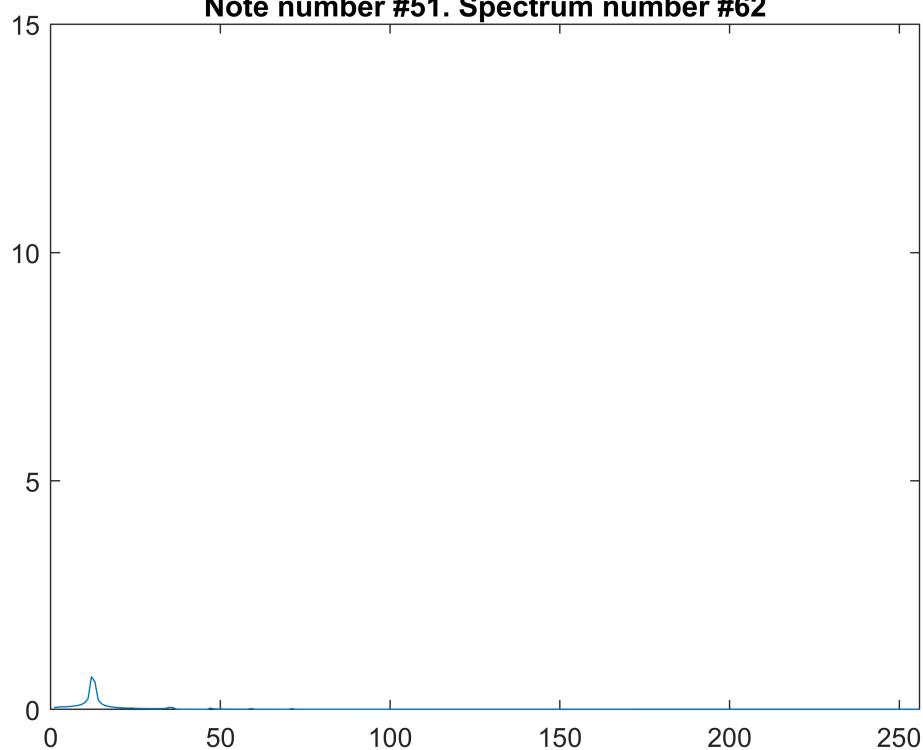
**Note number #51. Spectrum number #60**



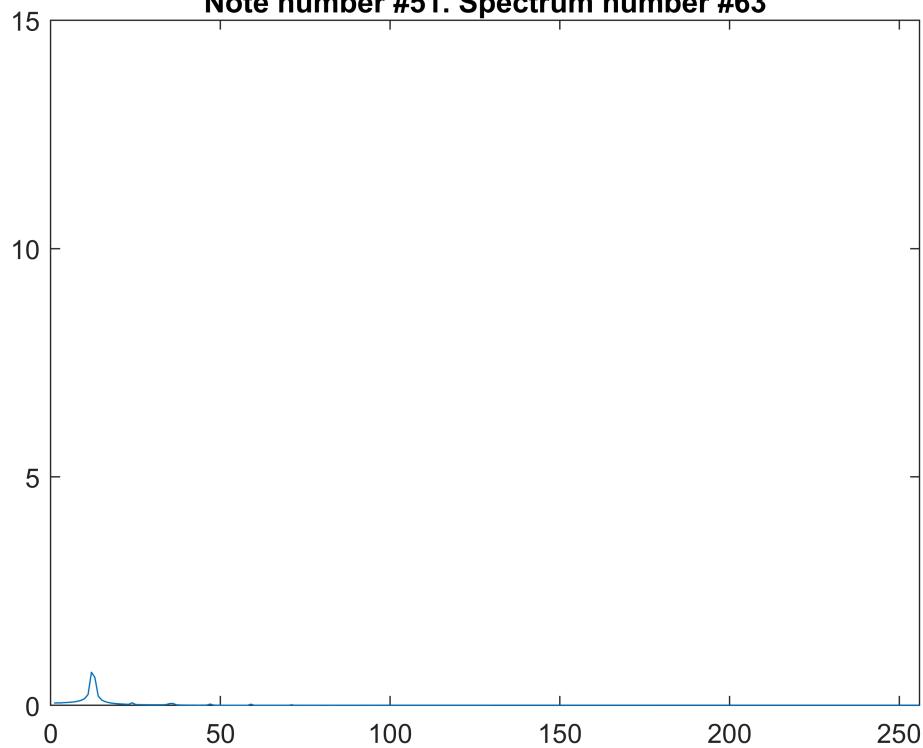
**Note number #51. Spectrum number #61**



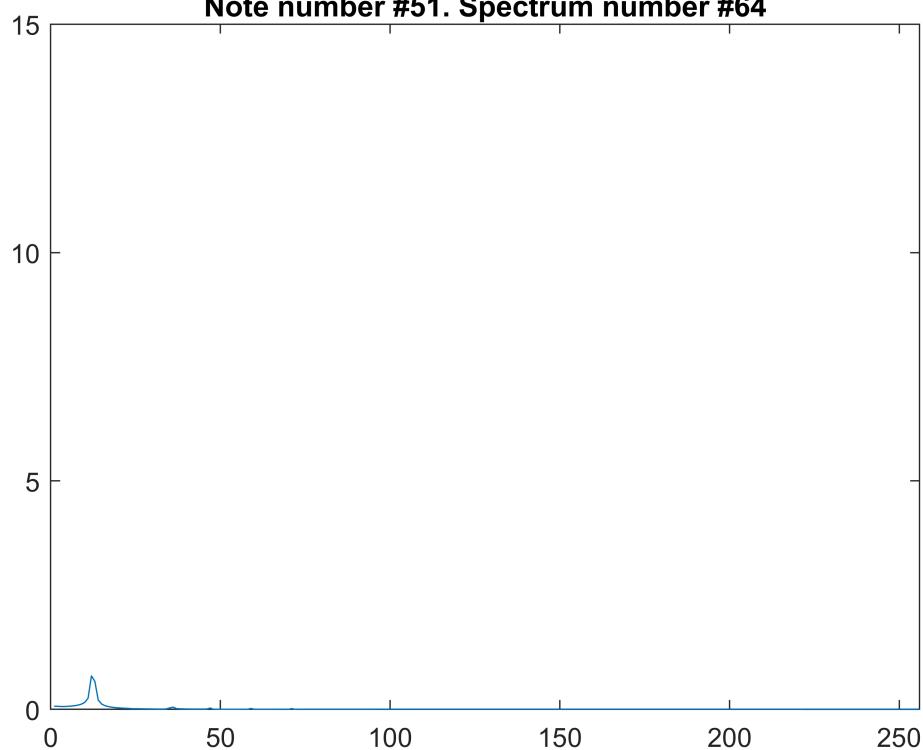
**Note number #51. Spectrum number #62**



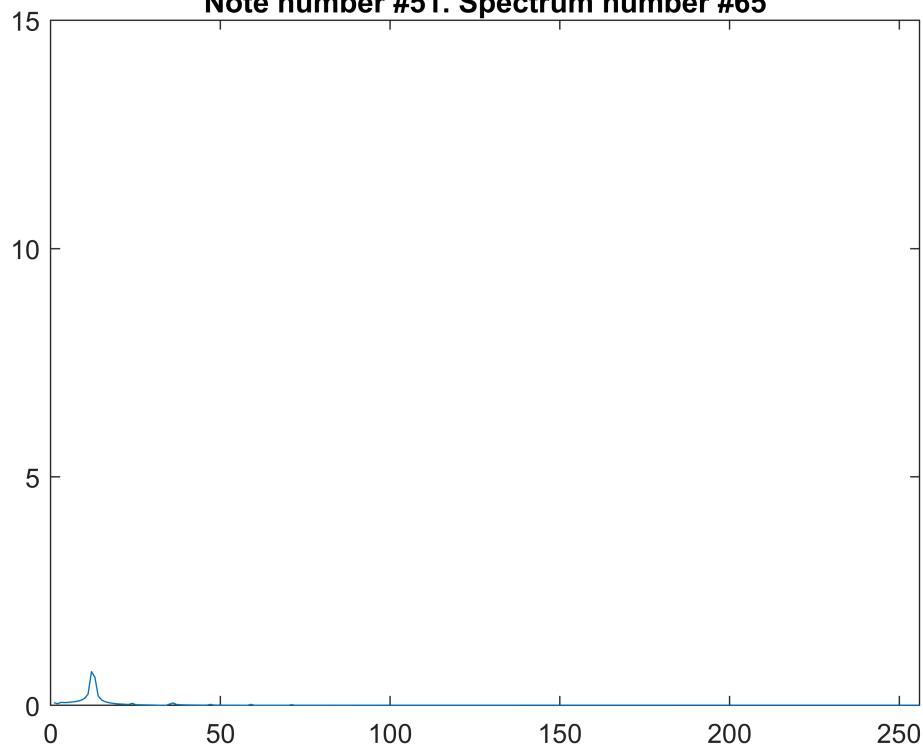
**Note number #51. Spectrum number #63**



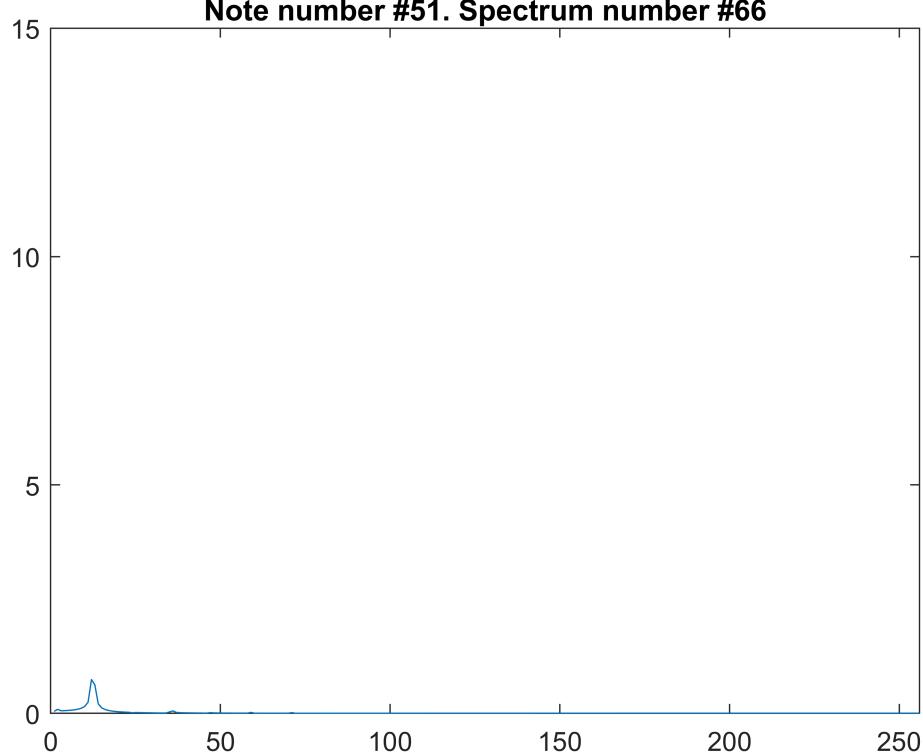
**Note number #51. Spectrum number #64**



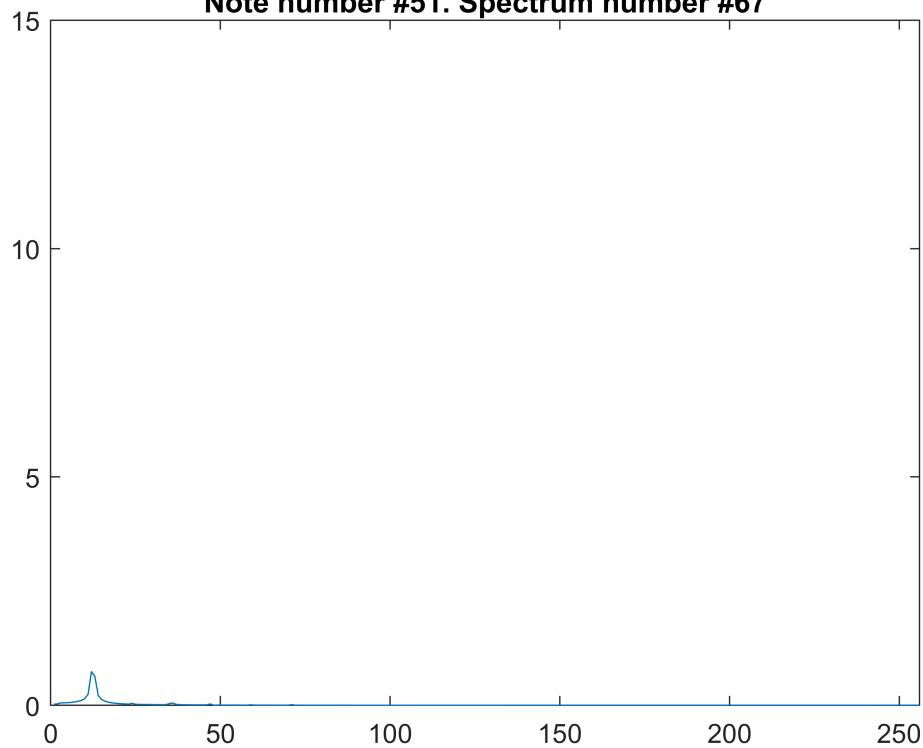
**Note number #51. Spectrum number #65**



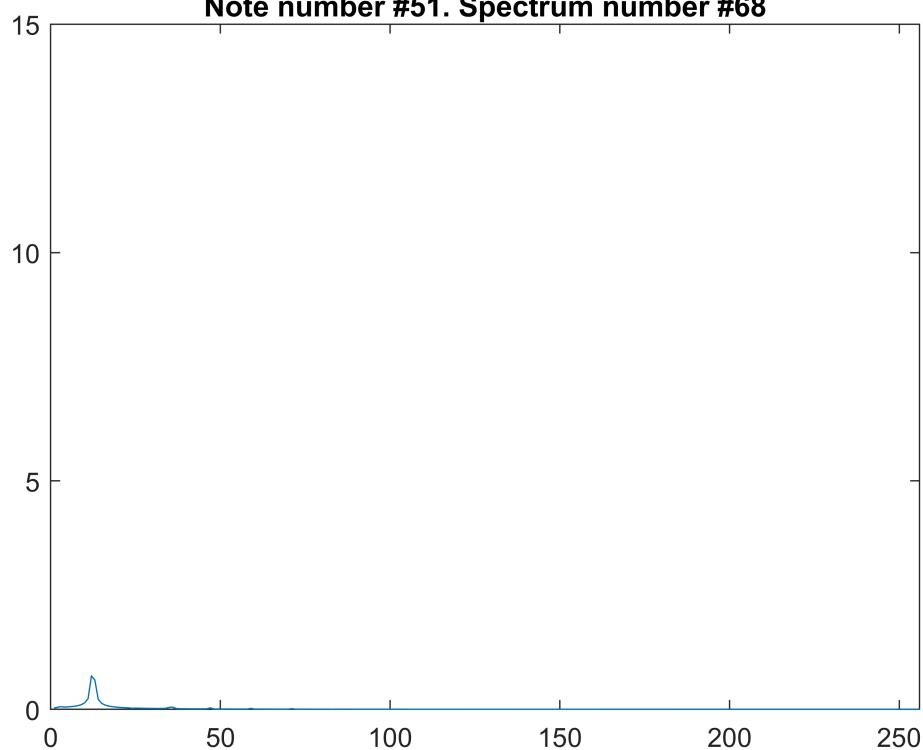
**Note number #51. Spectrum number #66**



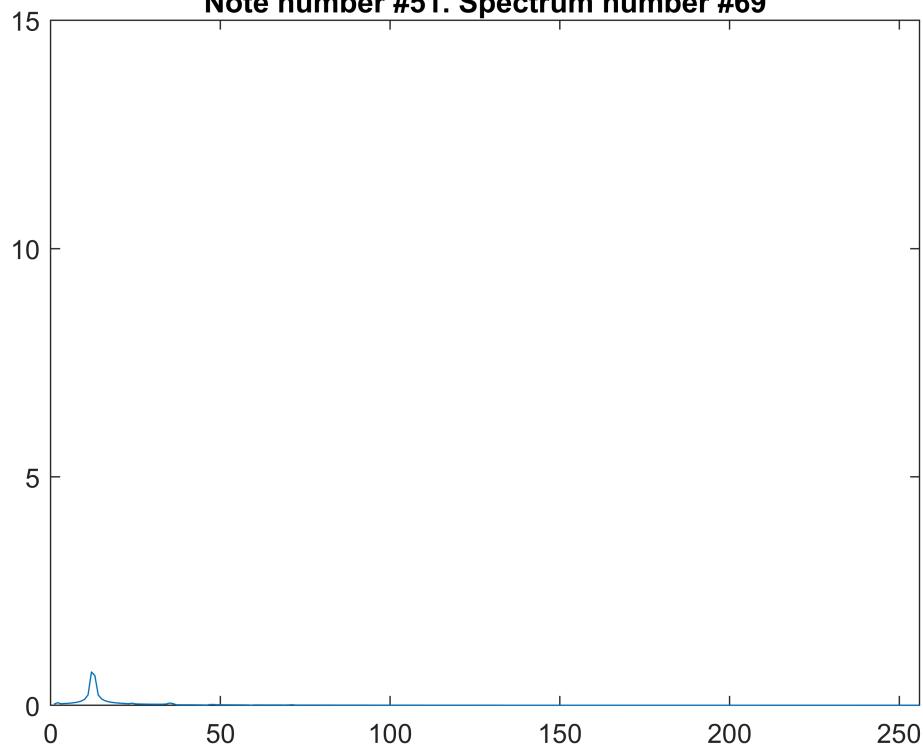
**Note number #51. Spectrum number #67**



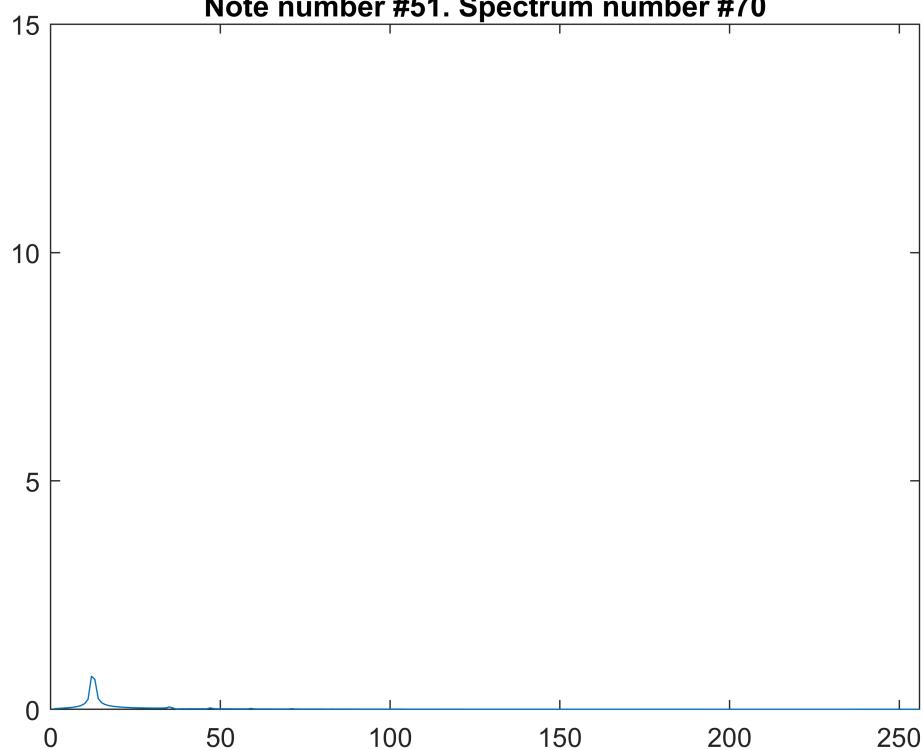
**Note number #51. Spectrum number #68**



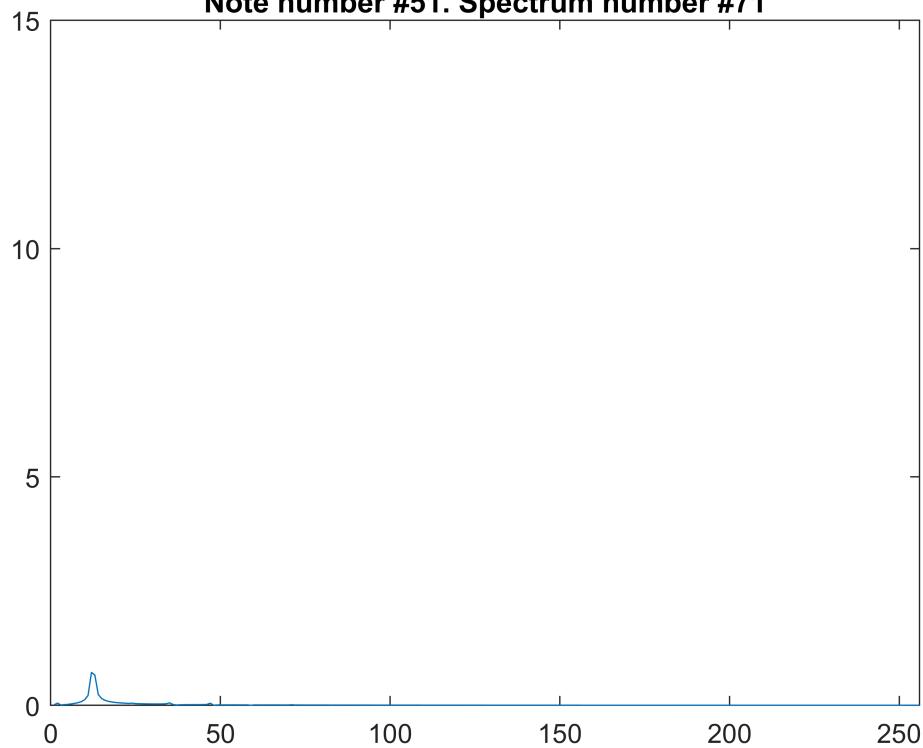
**Note number #51. Spectrum number #69**



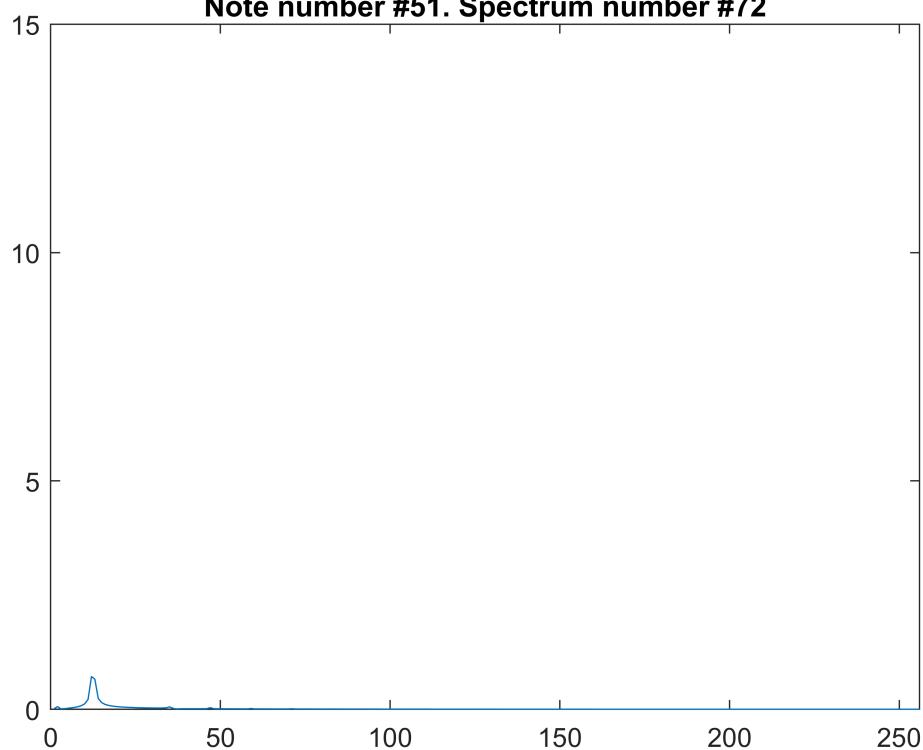
**Note number #51. Spectrum number #70**



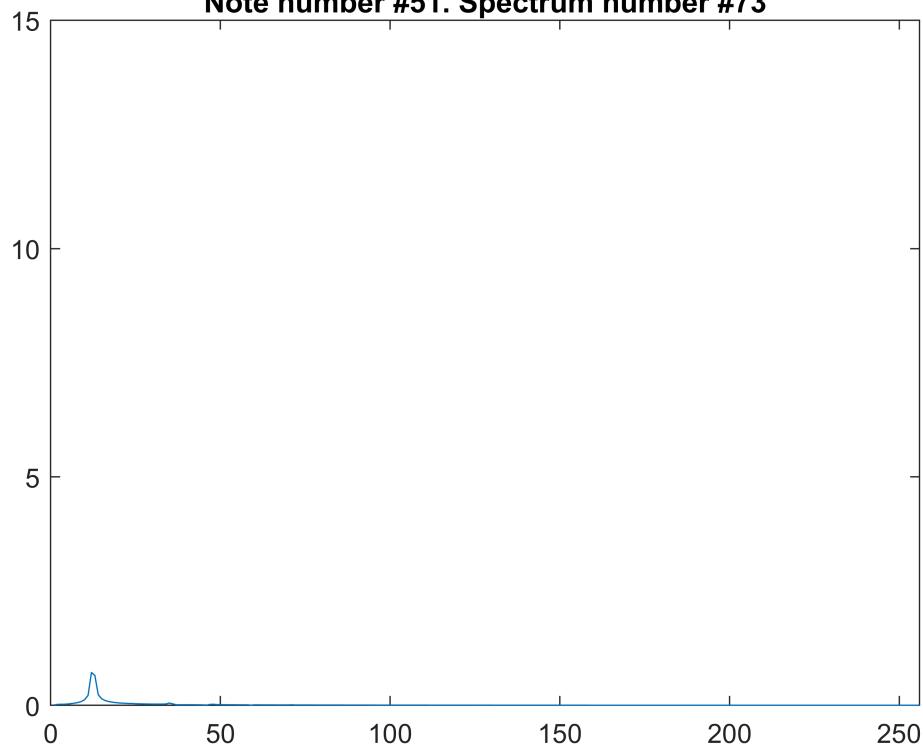
**Note number #51. Spectrum number #71**



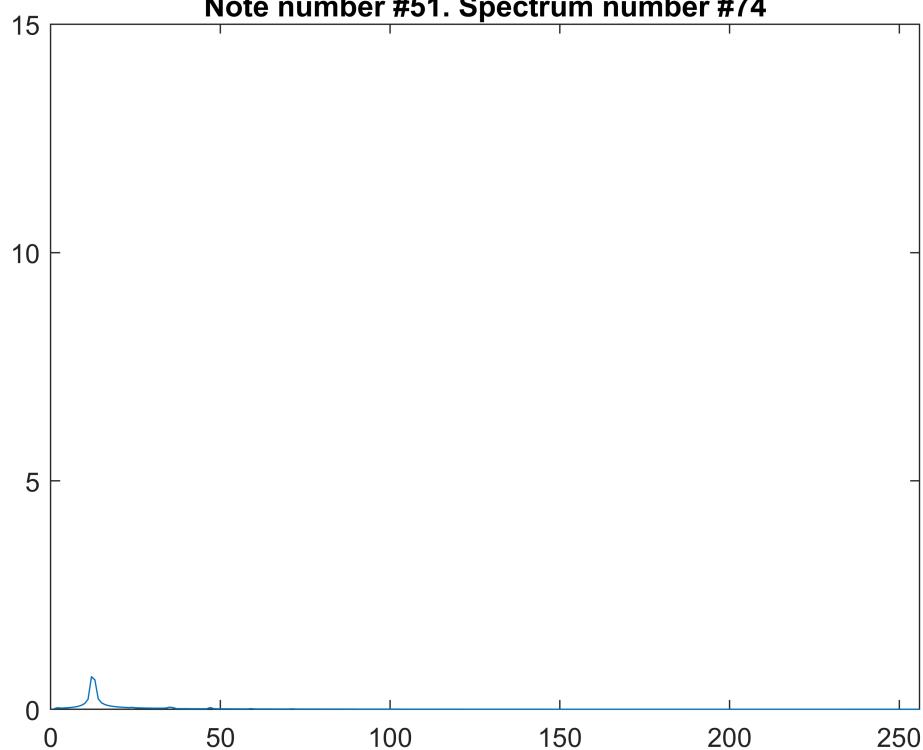
**Note number #51. Spectrum number #72**



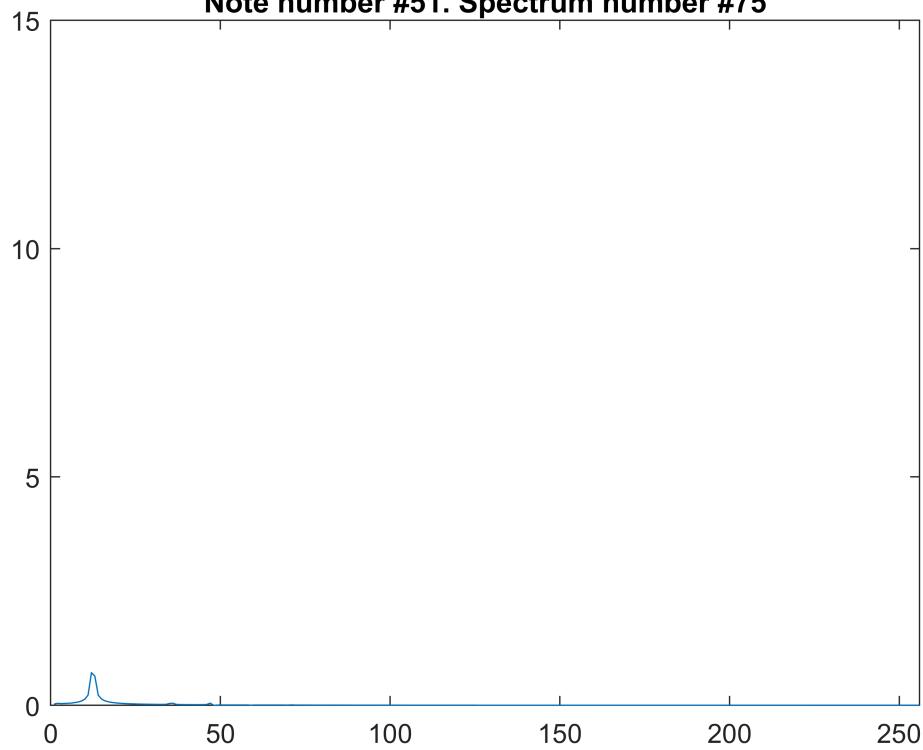
**Note number #51. Spectrum number #73**



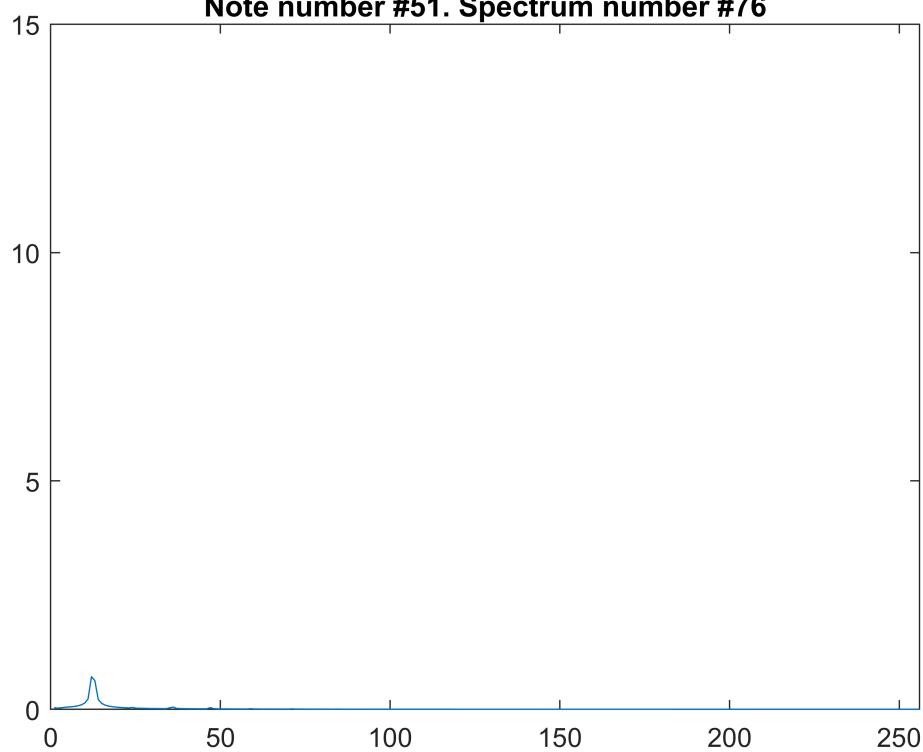
**Note number #51. Spectrum number #74**



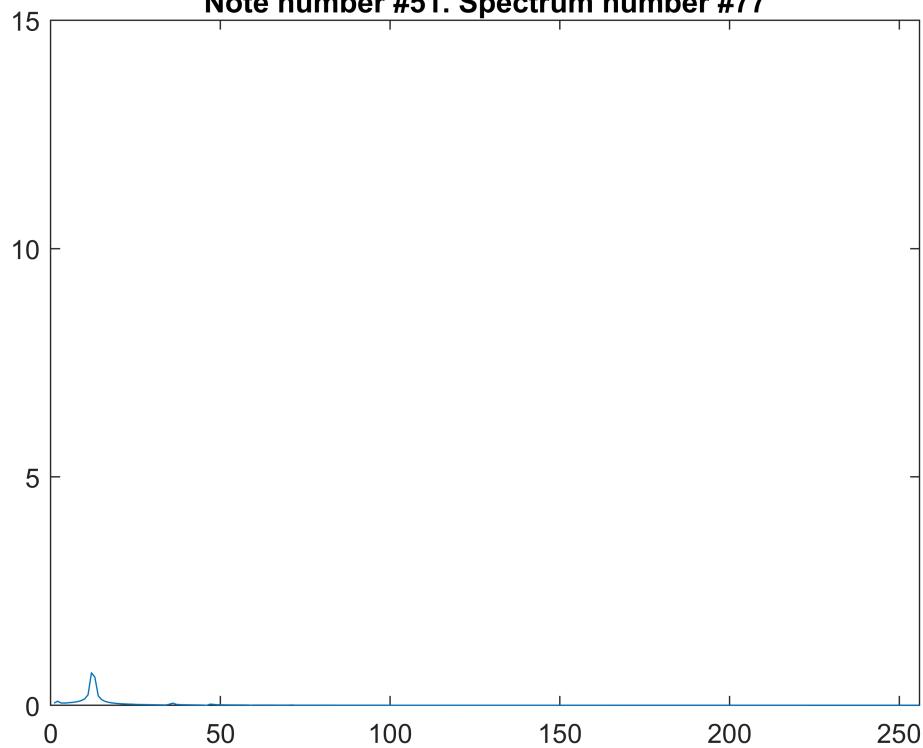
**Note number #51. Spectrum number #75**



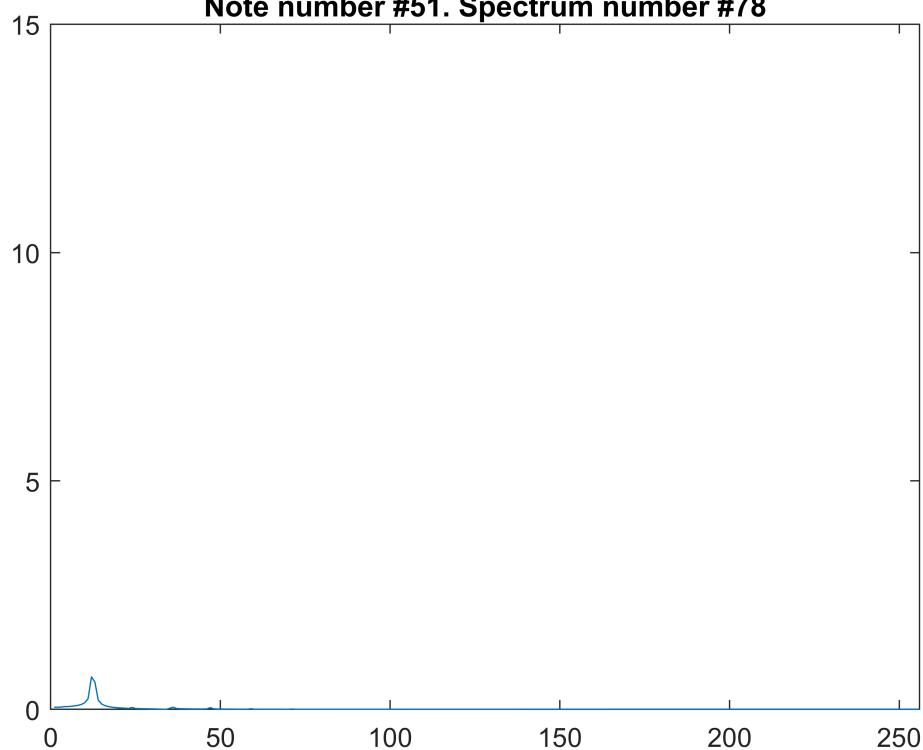
**Note number #51. Spectrum number #76**



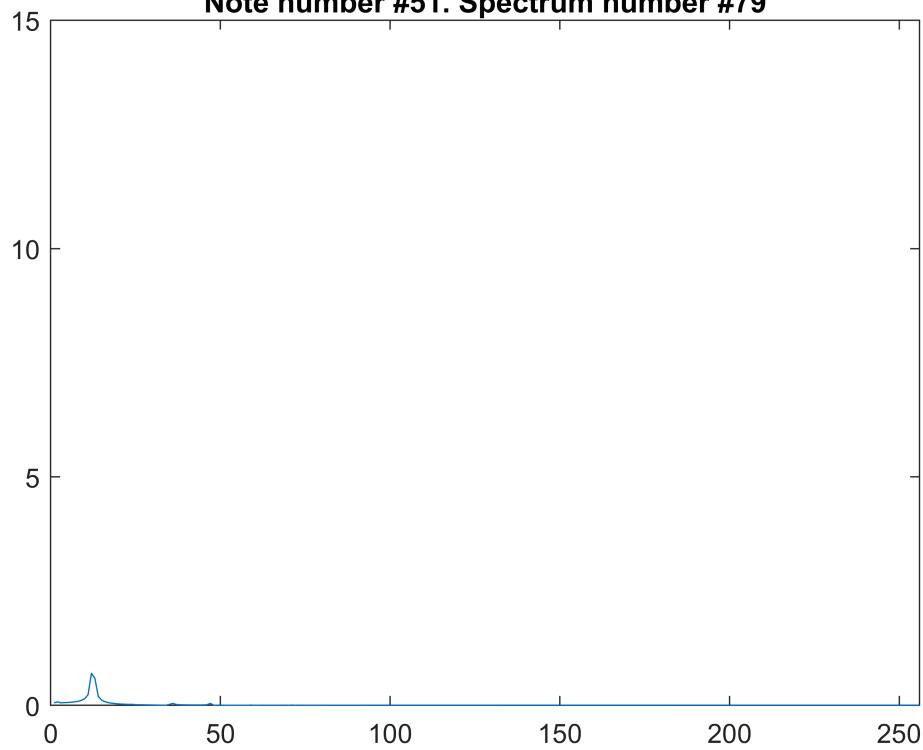
**Note number #51. Spectrum number #77**



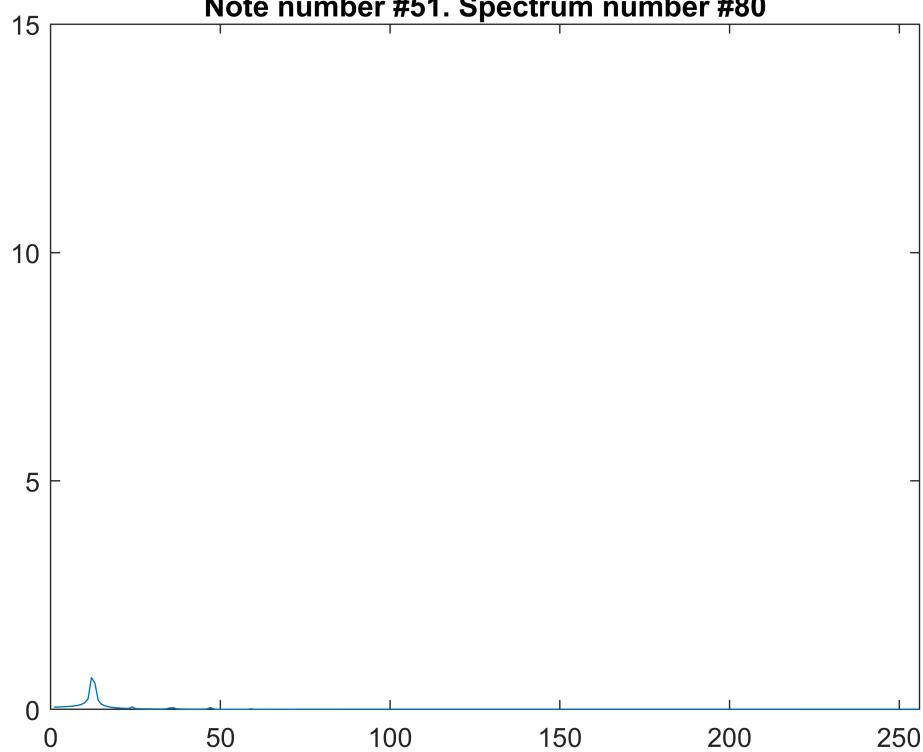
**Note number #51. Spectrum number #78**



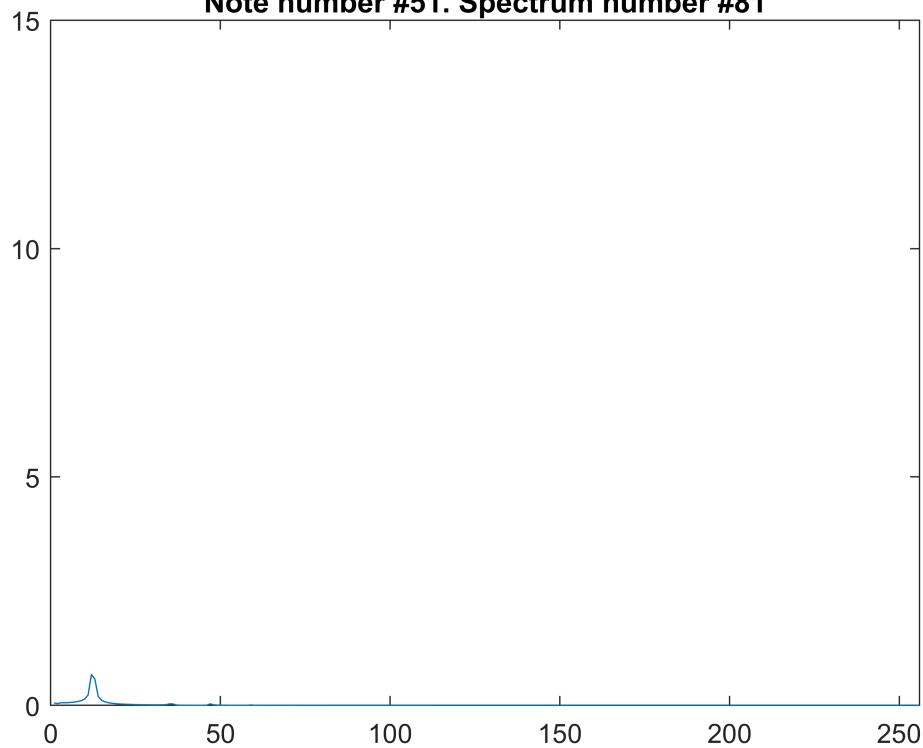
**Note number #51. Spectrum number #79**



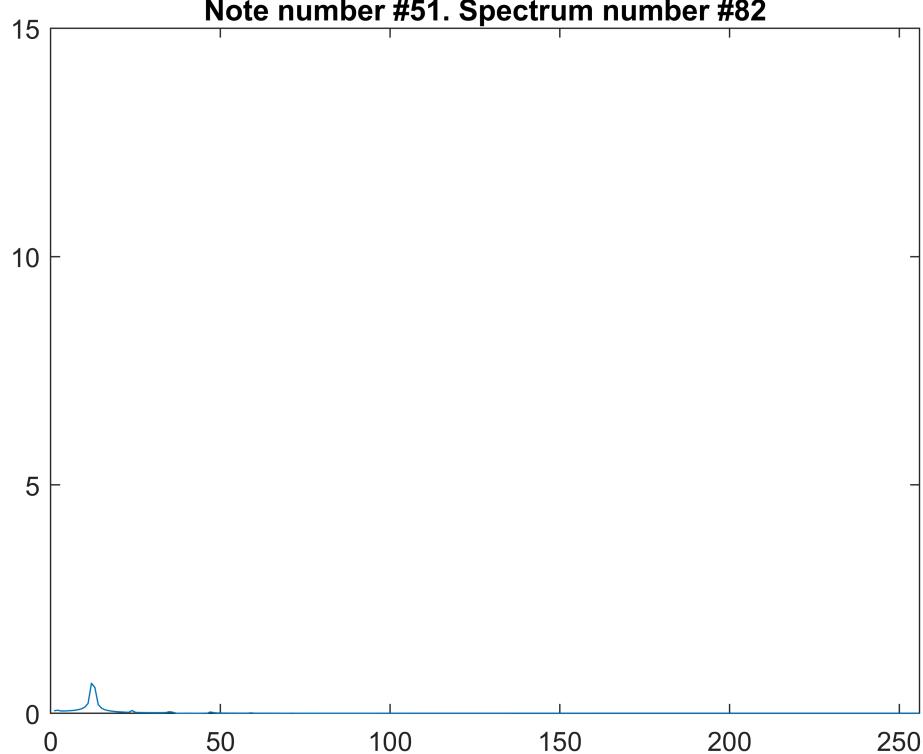
**Note number #51. Spectrum number #80**



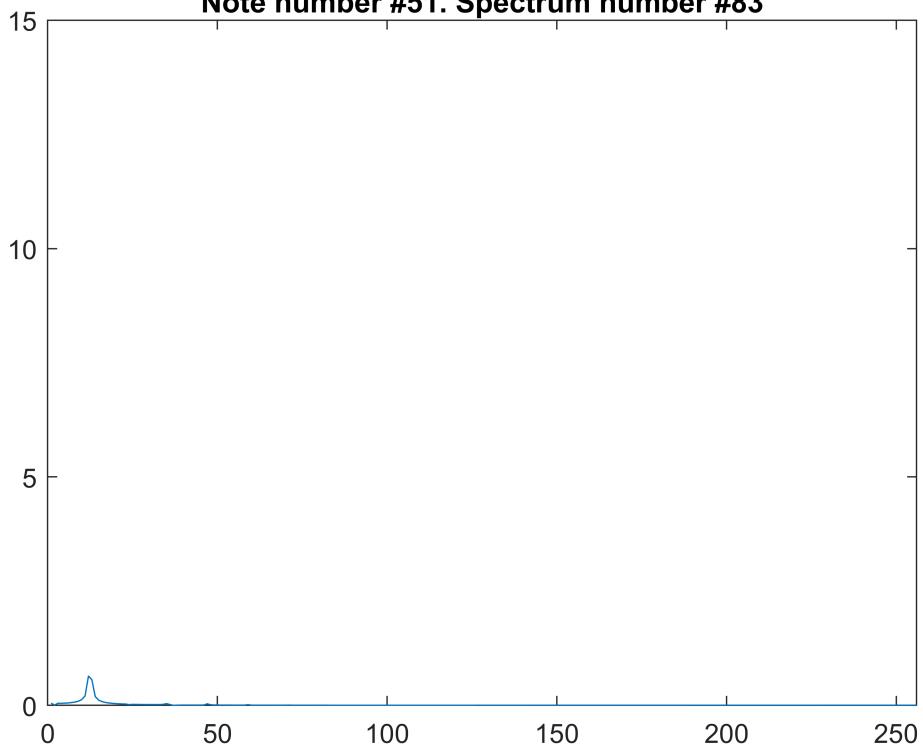
**Note number #51. Spectrum number #81**



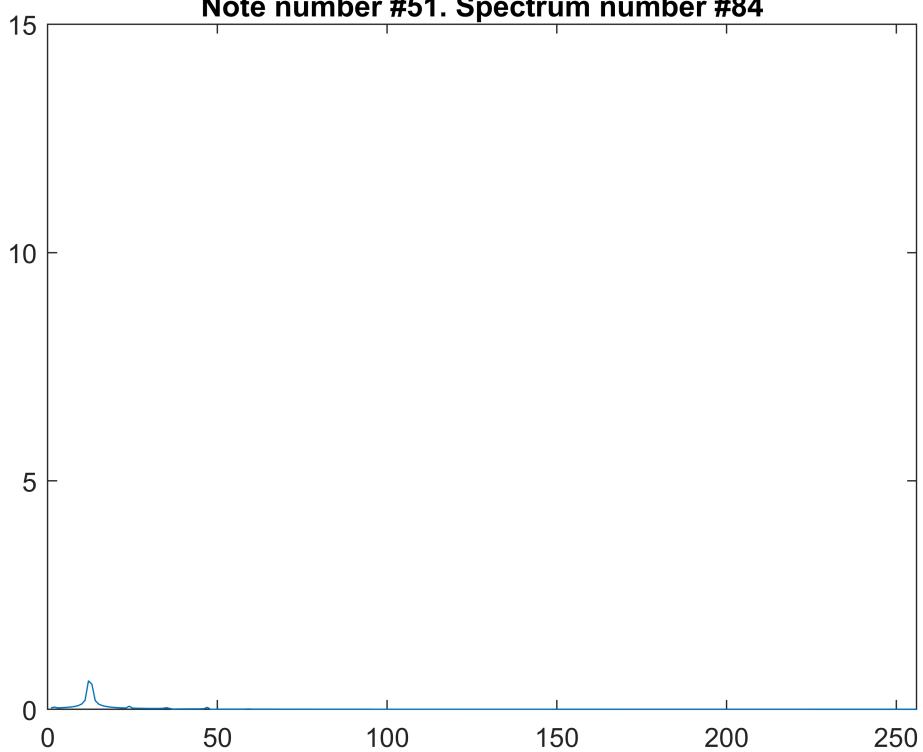
**Note number #51. Spectrum number #82**



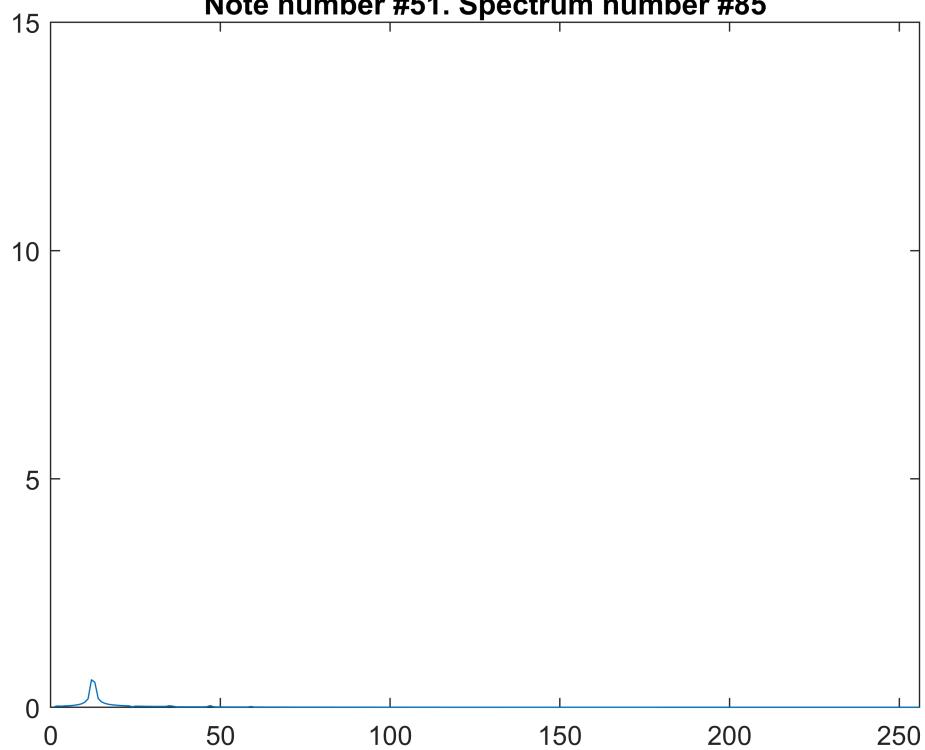
**Note number #51. Spectrum number #83**



**Note number #51. Spectrum number #84**



**Note number #51. Spectrum number #85**



**Note number #51. Spectrum number #86**

