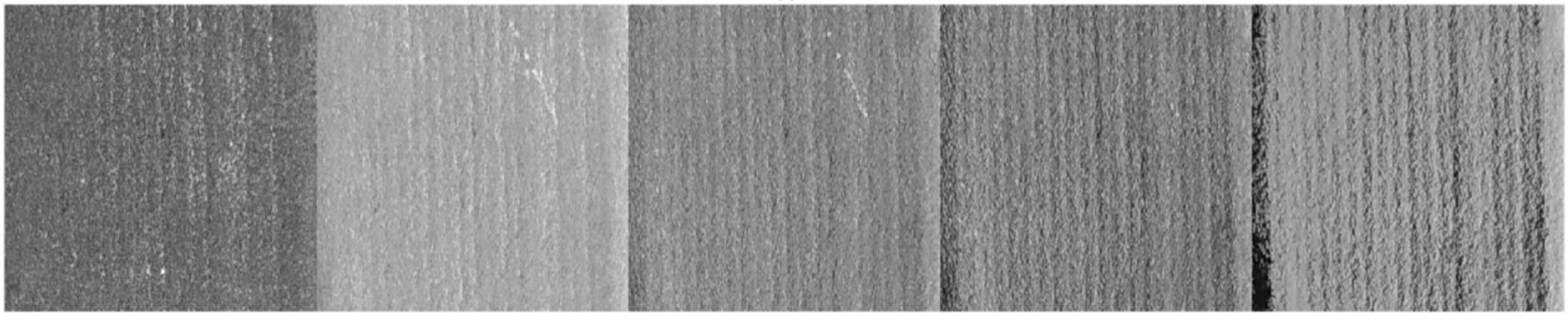
Contents

Getting images

```
img0 = imread('Im0.jpg');
imgray0=rgb2gray(imcrop(img0,[927.51 833.51 401.98 395.98]));
for i=1:5
S = dir(fullfile('*.jpg'));
img{i} = imread(S(i+1).name);
imgray{i}=rgb2gray(imcrop(img{i},[927.51 833.51 401.98 395.98]));
end
figure
montage({img{1},img{2},img{3},img{4},img{5}},'Size',[1,5]);
title('Sample Images')
figure
montage({imgray{1},imgray{2},imgray{3},imgray{4},imgray{5}},'Size',[1,5]);
title('Cropped')
```

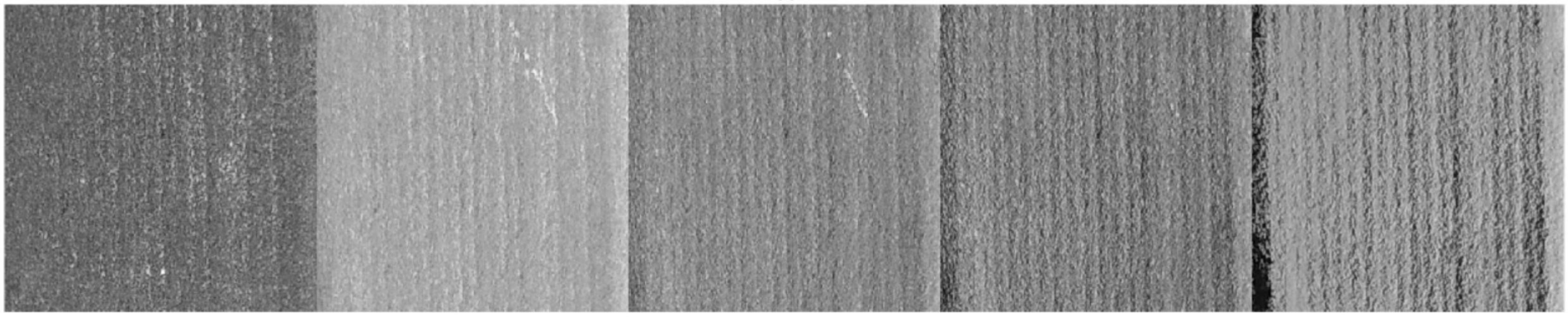

Sample Images

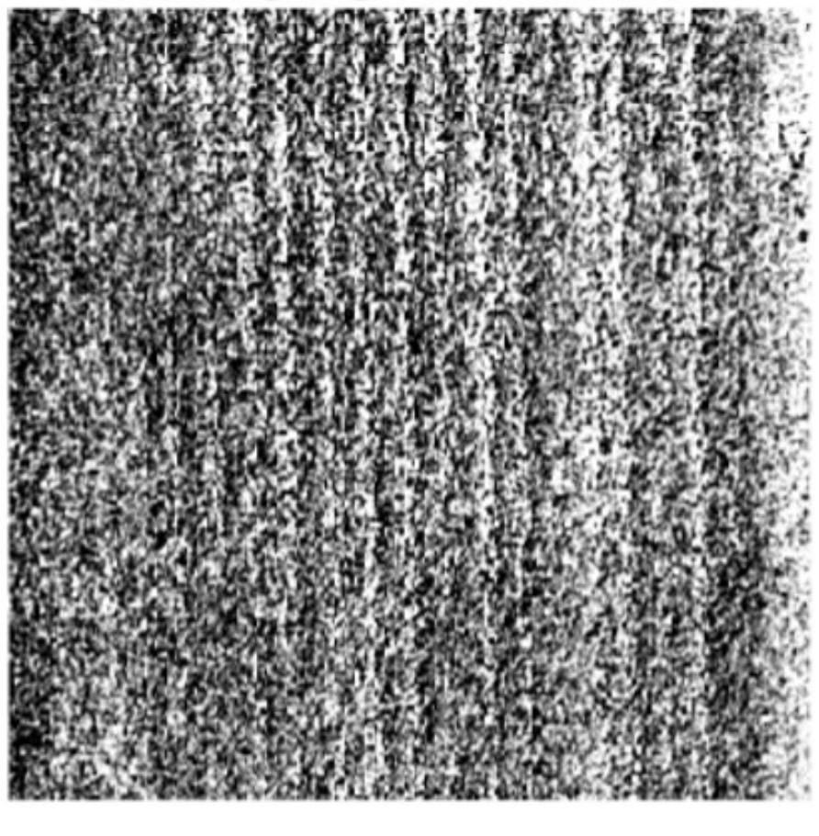

Cropped

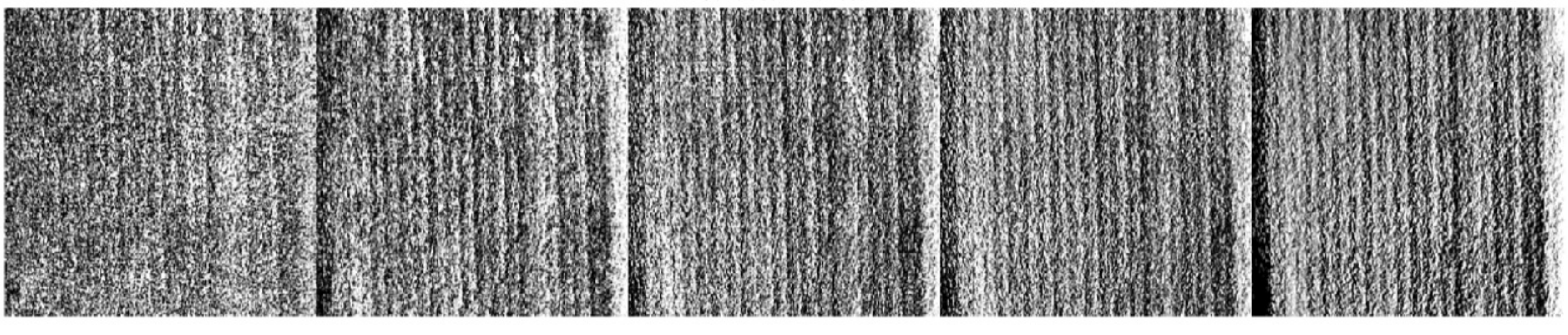
Enhancing the contrast

#0 flash0

```
J0 = histeq(imgray0); % Histogram Equilization
B0 = locallapfilt(J0,0.4,0.5); % Second Derivative
figure
imshow(B0);
title('Normal lighting Contrast Enhanced')
% #1
for i=1:5
JJ{i} = histeq(imgray{i}); % Histogram Equilization
BB{i} = locallapfilt(JJ{i},0.4,0.5); % Second Derivative
end
figure
montage({BB{1},BB{2},BB{3},BB{4},BB{5}},'Size',[1,5]);
title('Contrast Enhanced')
```

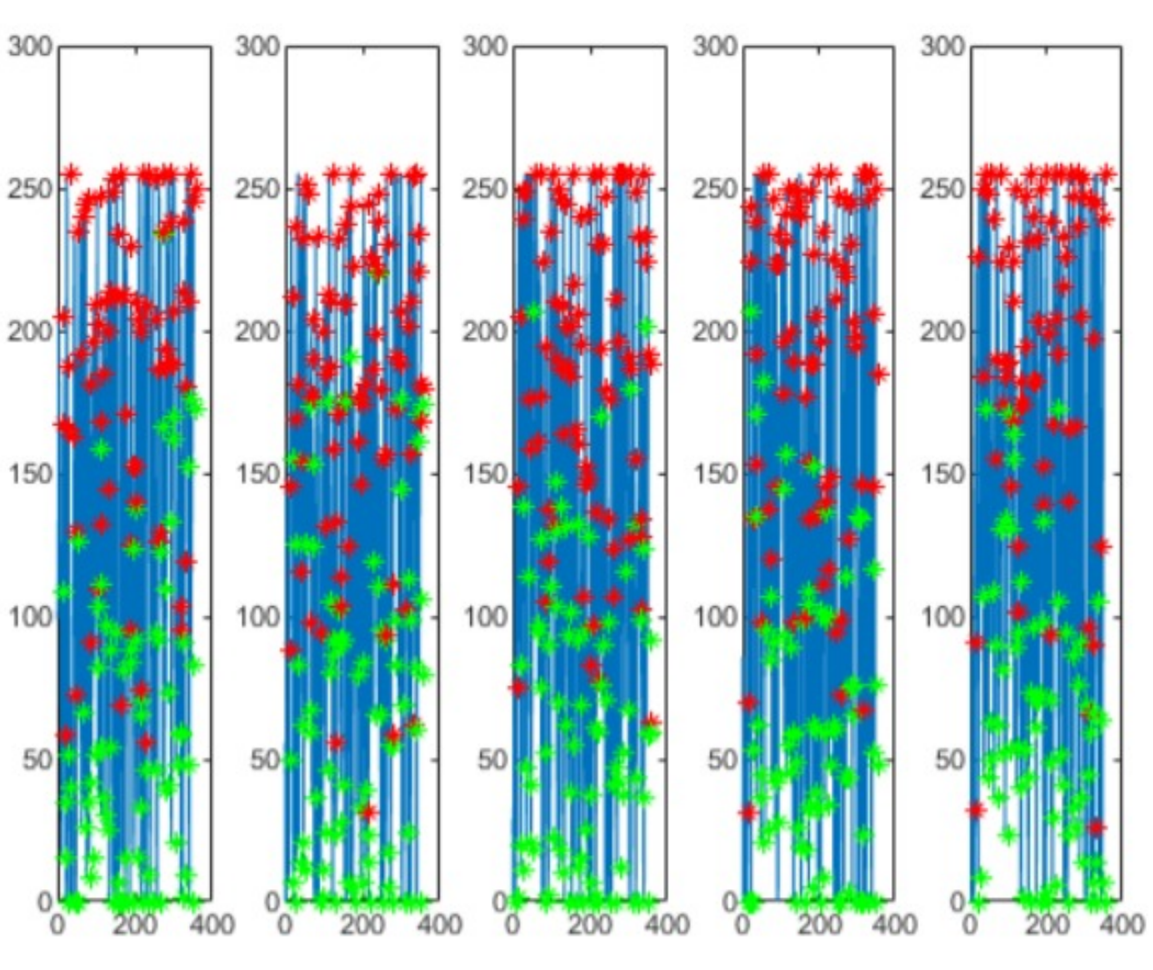

Cropped


Normal lighting Contrast Enhanced


Contrast Enhanced

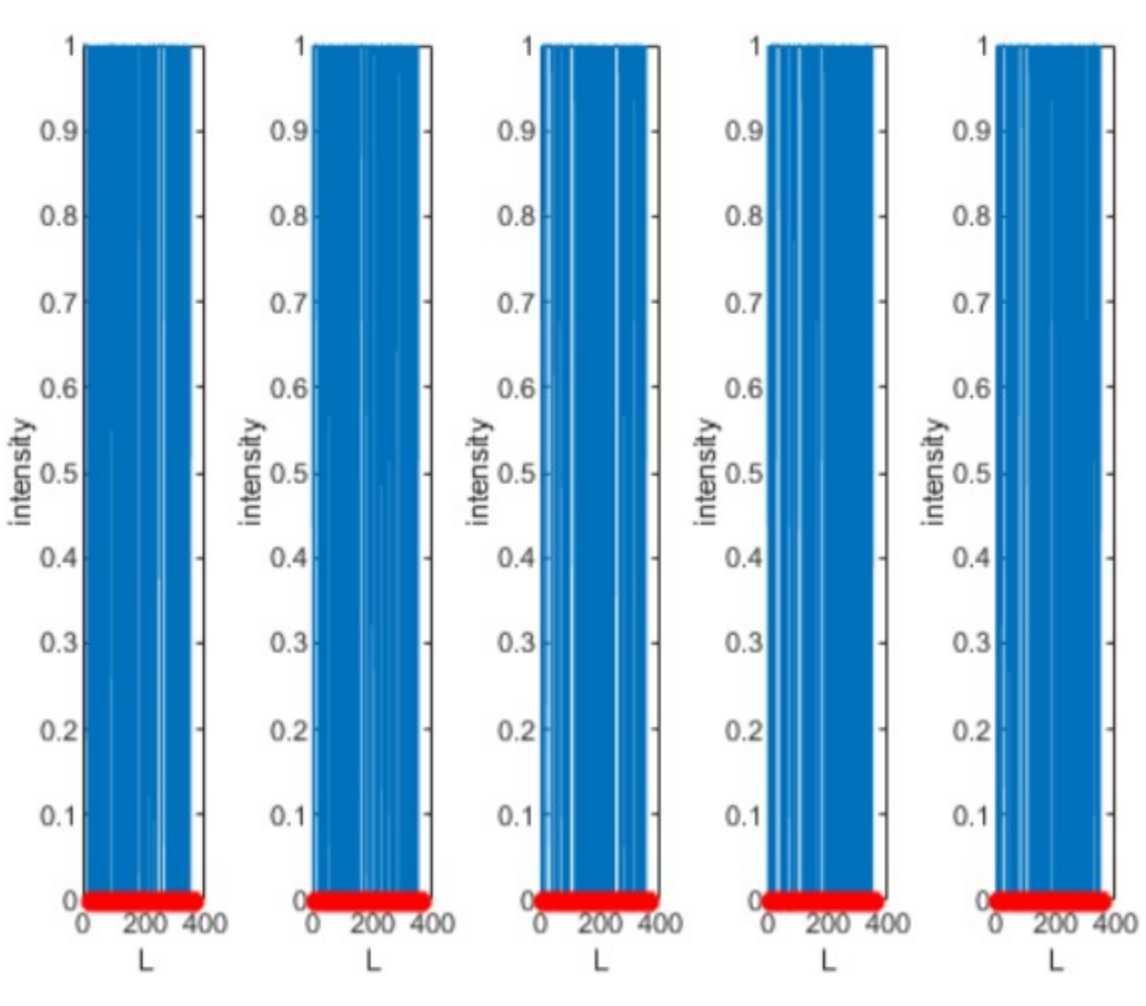
Selection of a base line for intensity profile

```
figure
for i=1:5
subplot(1,5,i)
imshow(BB{i});
hold on;
p1 = [10 360]; % Start point of base line
p2 = [110 110]; % End point of base line
plot(p1,p2,'Color','r','LineWidth',2);
hold off;
subplot(1,5,i)
plot(improfile(BB{i},p1,p2)); % intesity profile of at the base line
hold on;
% #Evaluating peaks and valley of the intesity profile at base line
[fx,fy,f]=improfile(BB{i},p1,p2);% Intensity info at the base line
for x=2:350
    if f(x)>f(x+1) && f(x)>f(x-1) % Local Maximas
        plot(fx(x+1),f(x),'*r');
    end
     if f(x)<f(x+1) && f(x)<f(x-1) % Local Minimas
        plot(fx(x+1),f(x),'*g');
    end
end
hold off;
end
```



Differencing the two images to segment the shadow for depth analysis

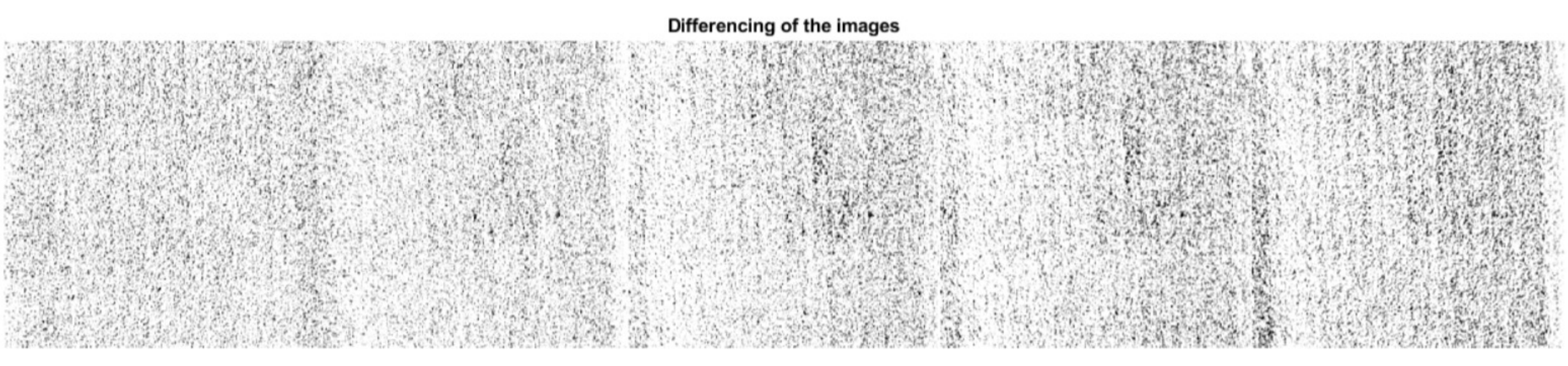
```
for i=1:5
imgdif{i} = abs(imcomplement(BB{i})-imcomplement(B0)); % differenceing the images from Flash1 and Flash2
L{i}=imcomplement(imgdif{i});
%Lgray{i}=rgb2gray(L{i});
% Thresholding for consistent shadows
bw{i}=imbinarize(L{i},0.9);
subplot(1,5,i)
imshow(bw{i})
hold on;
% #Selection of base line for intesity profile imshow(bw1);
p3=[10 360]; % Start point of base line
p4=[110 110]; % End point of base line
plot(p3,p4,'Color','r','LineWidth',2);
hold off;
[cx,cy,c]=improfile(bw{i},p3,p4);
% #Intensity Profile at the base line
profile=improfile(bw{i},p3,p4);
subplot(1,5,i)
plot(profile);
%title('Intensity profile with highlited shadow location overt the base line')
xlabel('L')
ylabel('intensity')
hold on;
% #Depth map from the length of shadows obtained from the intensity profile
for k=1:350 % Find for the shadow region
    if c(k)==0
        plot(cx(k+1),c(k),'*r','LineWidth',3);
    end
end
len={};s=1; % Array to store the lengths of the shadows at the base line
for l=1:length(cx)-1
    if c(l)==1
        if c(l+1)==0
            l1=cx(l+1);
        end
    end
    if c(l)==0
        if c(l+1)==1
            len{s}=cx(l)-l1;
            s=s+1;
        end
    end
     t=0;
    for f=1:length(len)
        if len{f}~=0
           t=t+1;
        end
    end
    total{i}=t;
end
hold off;
end
```

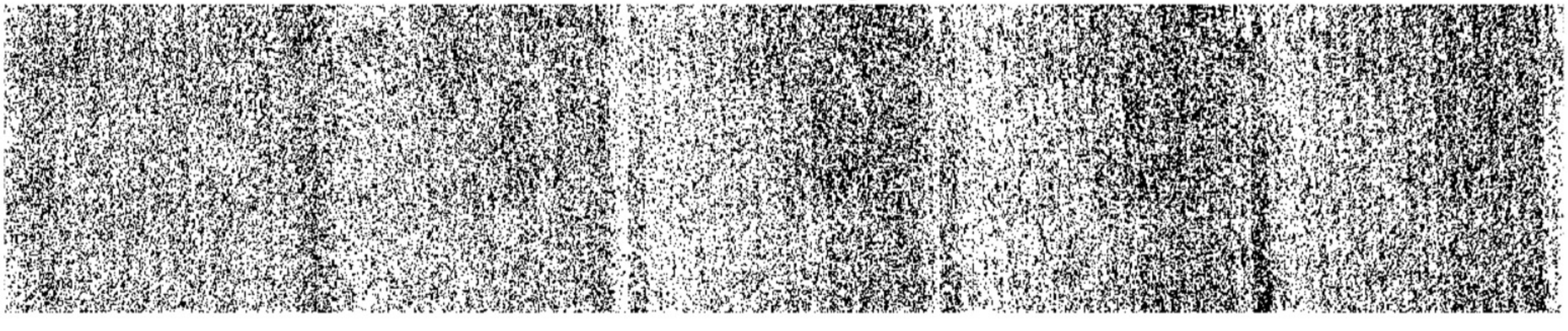


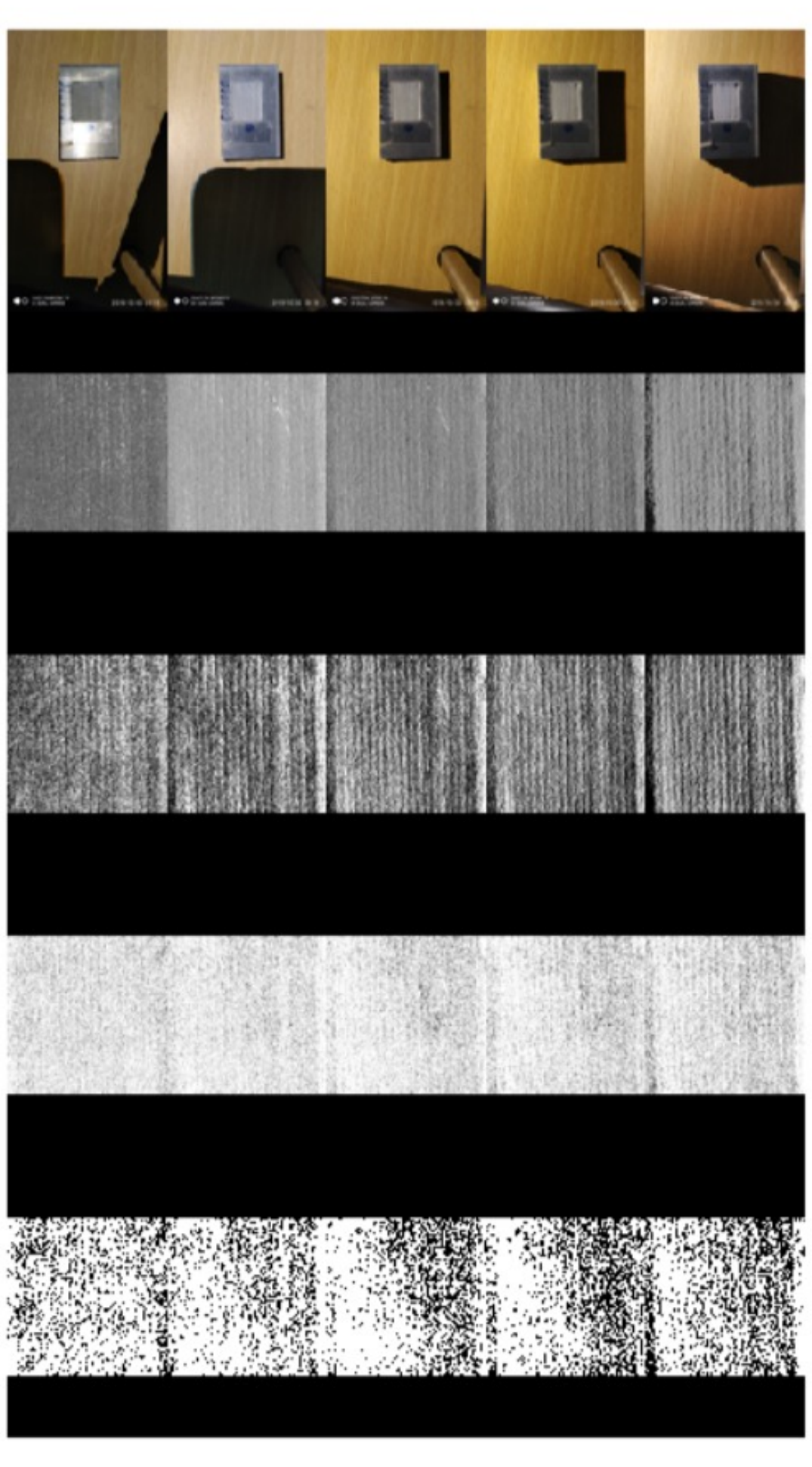
conclusion

```
figure
montage({L{1},L{2},L{3},L{4},L{5}},'Size',[1,5]); %Differencing of the images
title('Differencing of the images')
figure
montage({bw{1},bw{2},bw{3},bw{4},bw{5}},'Size',[1,5]);
title('Thresholded Image')
figure
montage({img{1},img{2},img{3},img{4},img{5},imgray{1},imgray{2},imgray{3},imgray{4},imgray{5},BB{1},BB{2},BB{3},BB{4},BB{5},L{1},L{2},L{3},L{4},L{5},bw{1},bw{2},bw{3},bw{4},bw{5}}, 'Size', [5,5]);
disp(total);
```

```
    [33]    [30]    [31]    [32]    [35]
```


Differencing of the images


Thresholded Image



Published with MATLAB® R2019b