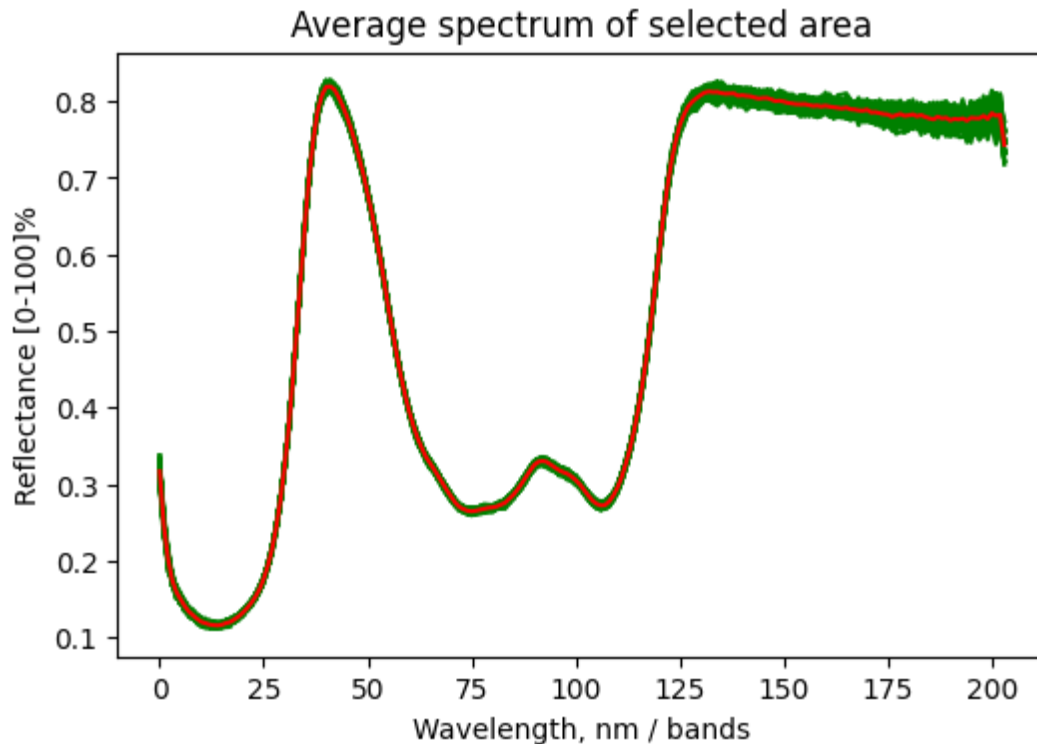


Task 1: Segmentation

Try segmentation for green-samples obtained with: sepcim IQ.

Here I first do the white correction for the specim IQ image and do the further analysis.

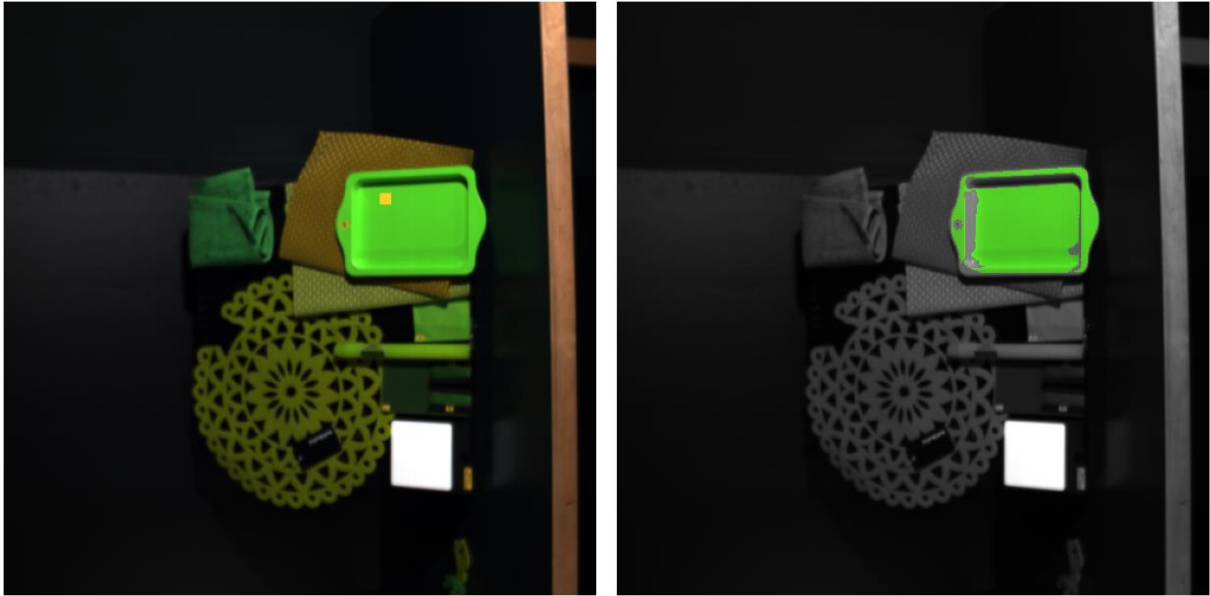
For the Specim IQ camera I tried to segment the green tray, let's have a look on the spectral distribution to get some important bands:



So by looking into the narrower area where there is not that many changes in distribution, I decided to use following bands as important bands:

```
bbands[0] = 30  
bbands[1] = 35  
bbands[2] = 50  
bbands[3] = 75  
bbands[4] = 100
```

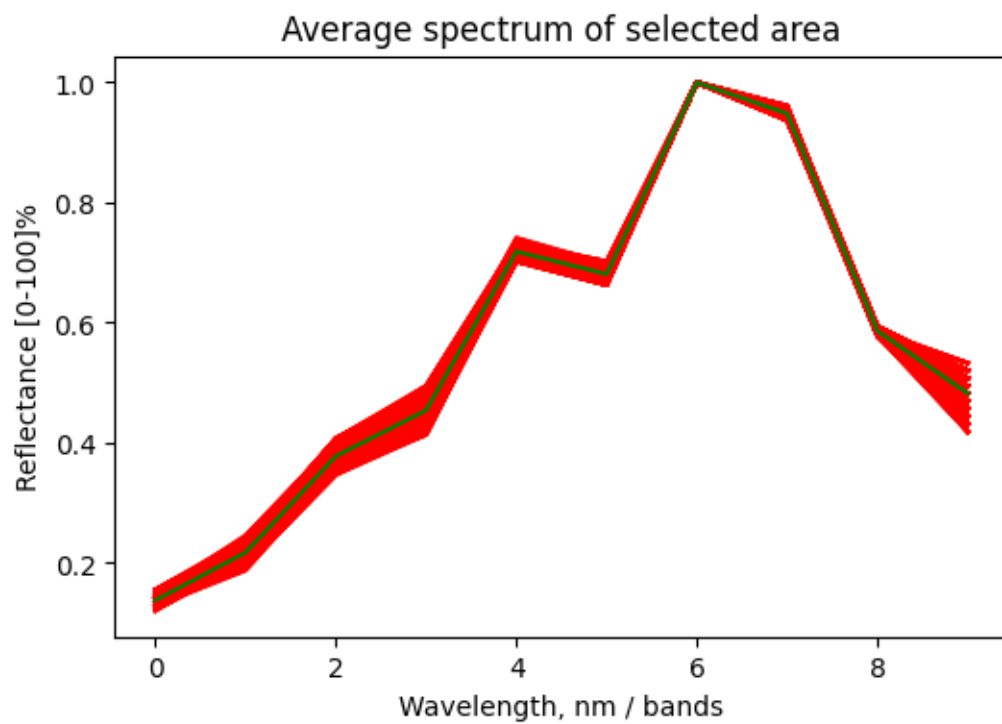
Below we can see the selected area and the segmented image. Although the tray did not segmented perfectly because the trays edges have different specularities, that is why the distribution is different in the edges which didn't segment perfectly. I think flat objects will be working good in such situation.



Next, let's try segmentation for green-samples obtained with: Tuneable.

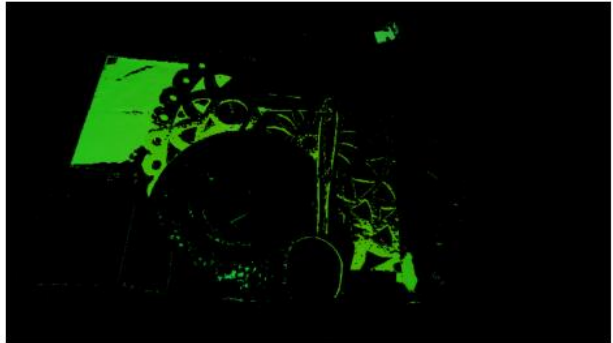
Here I first did the white correction for the tunable spectral cube I created and did the further analysis afterwards.

Similarly, here I tried to segment the green paper, let's have a look on the spectral distribution to get some important bands:



So here I decided to use this bands as important bands:

```
bbands[0] = 4  
bbands[1] = 6  
bbands[2] = 7
```

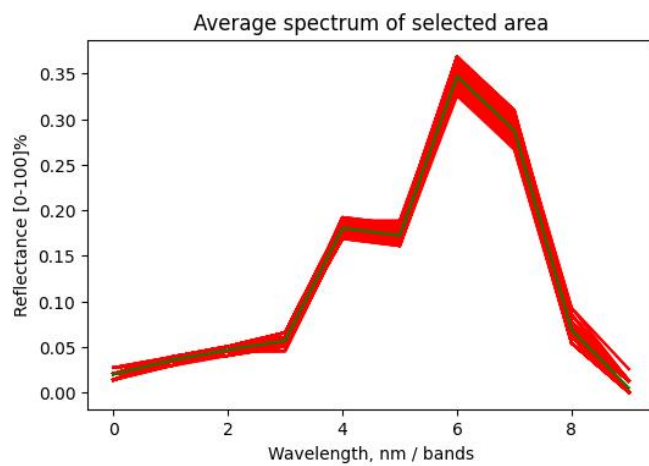


Segmentation result is almost satisfactory.

Another segmentation example with Tuneable:

Important Bands:

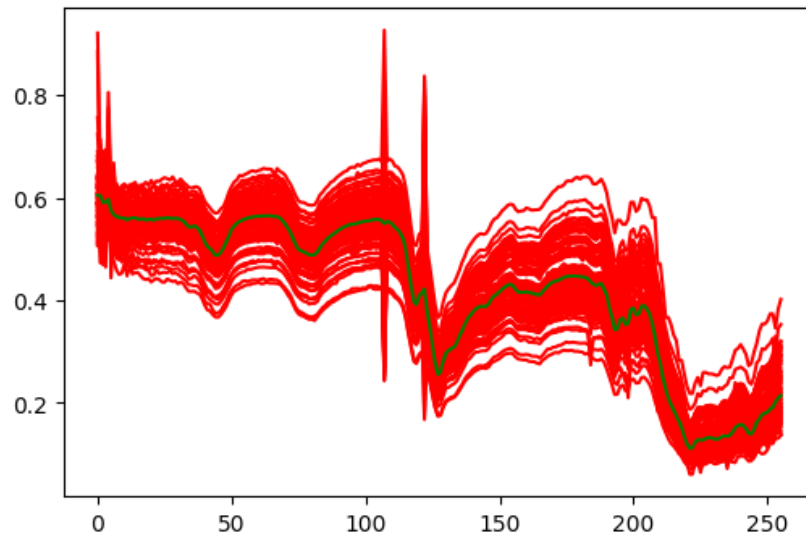
```
bbands[0] = 1  
bbands[1] = 3  
bbands[2] = 7
```



Next, let's try segmentation for green-samples obtained with: Scanner.

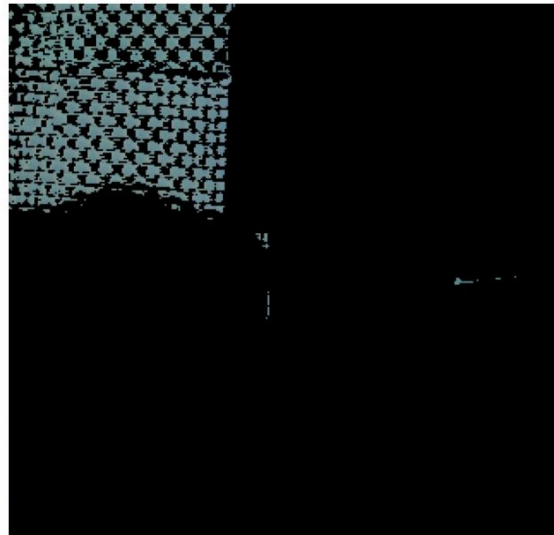
Here I first do the white correction for the Scanner IR image and do the further analysis.

For the Scanner IR camera I tried to segment the Curtain(not exactly sure what it is, you can have an idea watching the selection), let's have a look on the spectral distribution to get some important bands:



So here I decided to use these bands as important bands:

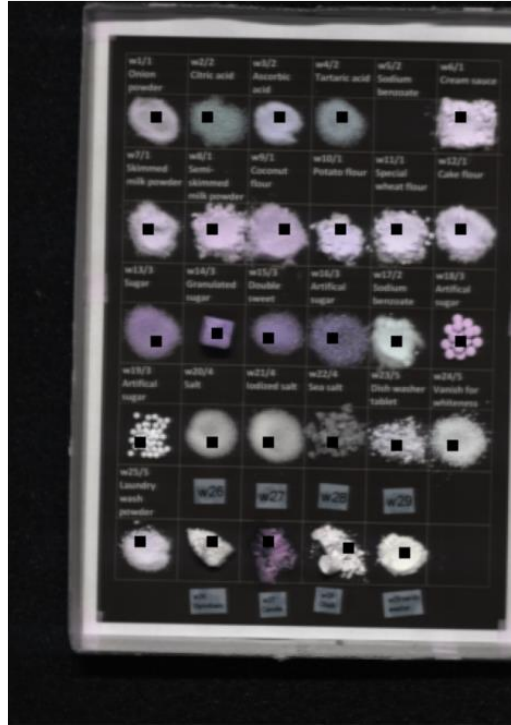
```
bbands[0] = 28  
bbands[1] = 70  
bbands[2] = 25  
bbands[3] = 110  
bbands[4] = 220  
bbands[5] = 245
```



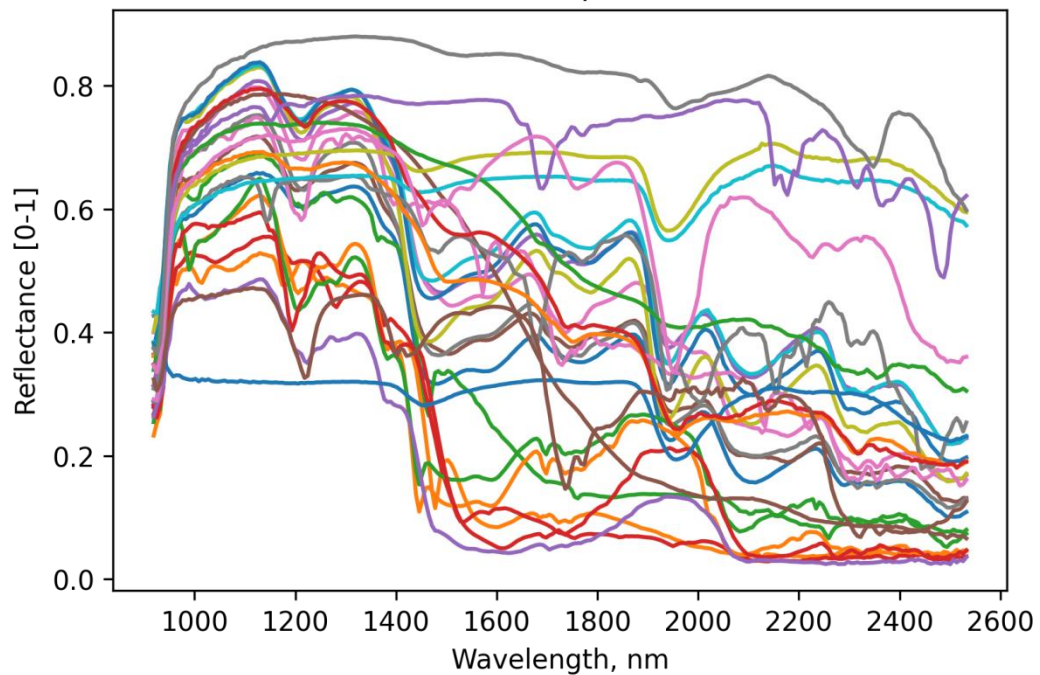
So, looking at the segmentation, it seems the result is pretty satisfactory.

Tasks #2. White powders

IR Powder image: Let's first look into the IR image, for this I selected all the powders and plotted their corresponding spectral distribution.



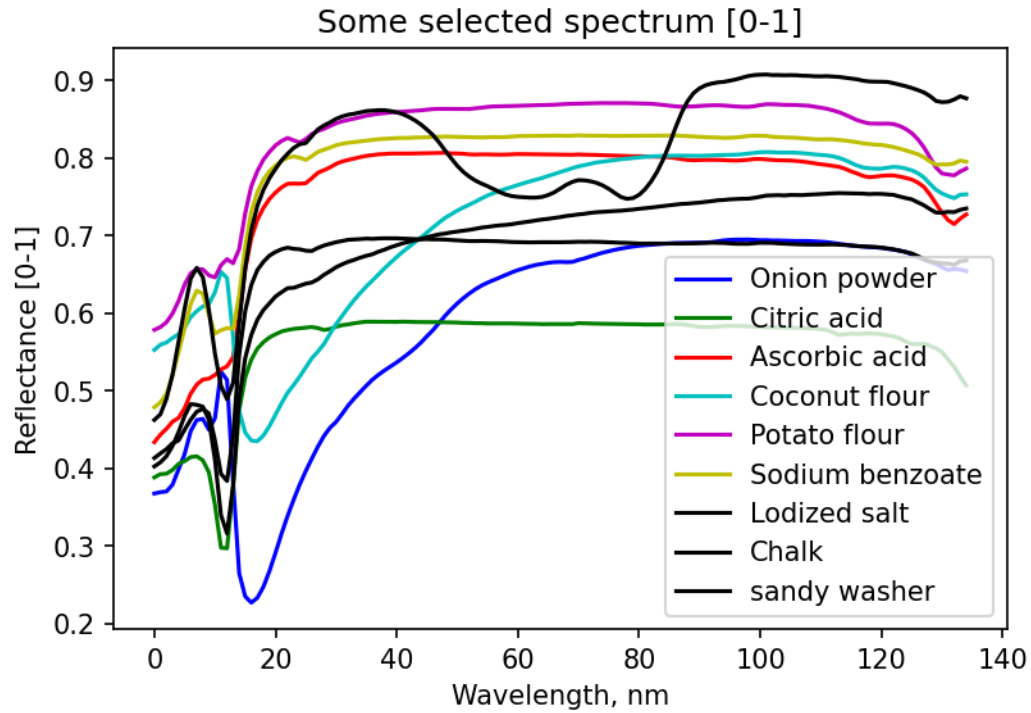
Some selected spectrum [0-1]



```
ch_1 = 240 (2437.16nm)
ch_2 = 120 (1679.5nm)
ch_3 = 90 (1490.44nm)
```

Visible Powder image: For this task I selected altogether 9 different powder where all of them have different characteristics in visible region(although almost similar with some shifting may be), similarly I can select all of them and plot them as well, but I think 9 of them is well enough to see how do they look in terms of spectral characteristics, although surely different material will have different characteristics. Below we can see the selected powders and their spectral distribution curve.





After selecting these three different channels given below, I found RGB preview as below with maximum of colors:

ch_1 = 110 (878.5 nm)

ch_2 = 42 (529.72 nm)

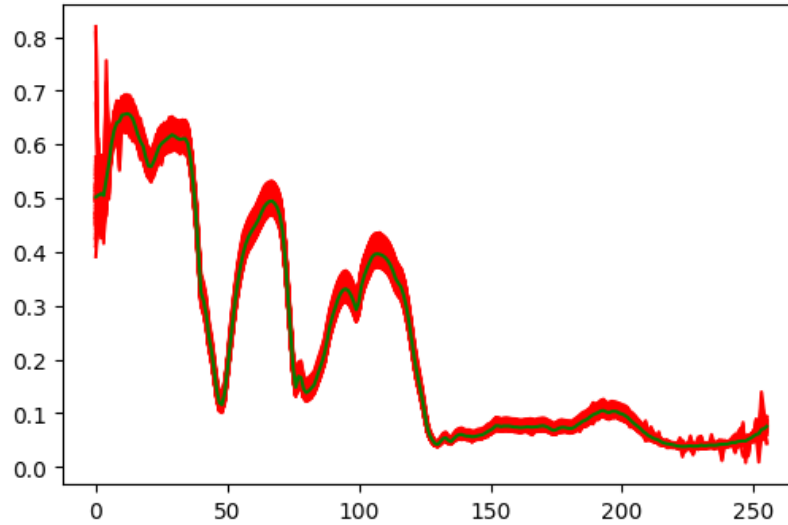
ch_3 = 23 (435.69nm)



Tasks #3. Plastic green leaves

We had different plastic materials although other group had leaves:

Spectral distribution to get some important bands:



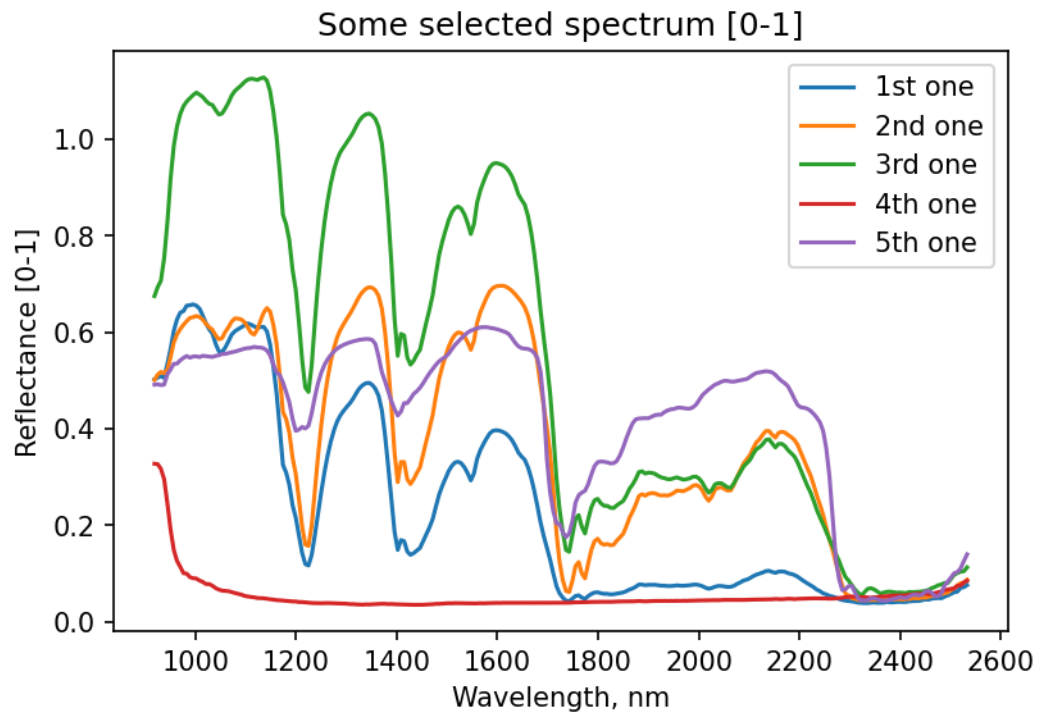
So here I decided to use these bands as important bands:

```
bbands[0] = 42  
bbands[1] = 55  
bbands[2] = 68  
bbands[3] = 115  
bbands[4] = 217
```



Although segmentation was struggling a bit here, then again the obtained results is satisfactory.

Spectral distribution of all five plastic materials: (1st one= top one, 5th one= bottom one)



Better RGB preview:

```
ch_1 = 240 (2437.16nm)
ch_2 = 120 (1679.5nm)
ch_3 = 90 (1490.44nm)
```



Looking into the plastic materials RGB preview and spectral distribution here we can see they are pretty different from one to another, even in the RGB preview they look different, although in our eyes they all are plastic materials and some of them might have similar appearances in terms of color in our eyes.