In [129]:

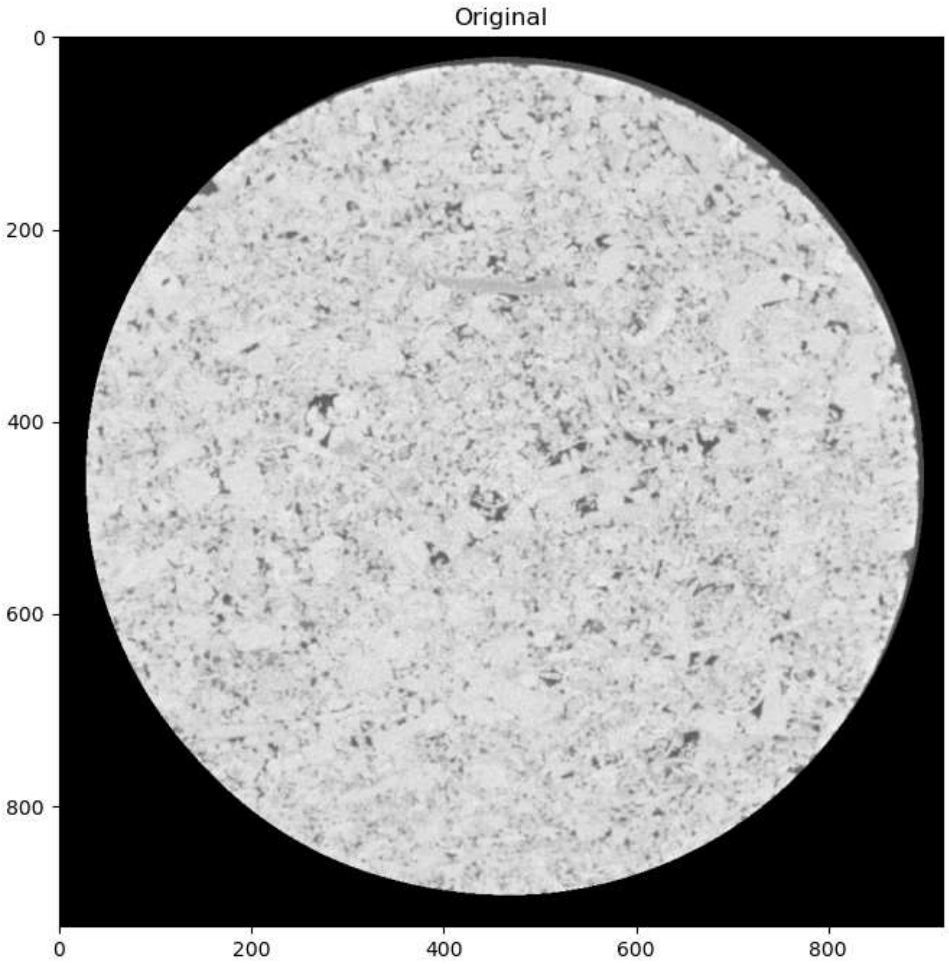
```
import matplotlib.pyplot as plt
import numpy as np
from mylib import *
from skimage.segmentation import mark_boundaries, slic
%matplotlib notebook
```

In [130]:

```
secao = np.load('secao_do_plug.npy')
```

In [131]:

```
show_gray(secao, "Original")
```



In [132]:

```
print("shape da secao original ->", secao.shape)
```

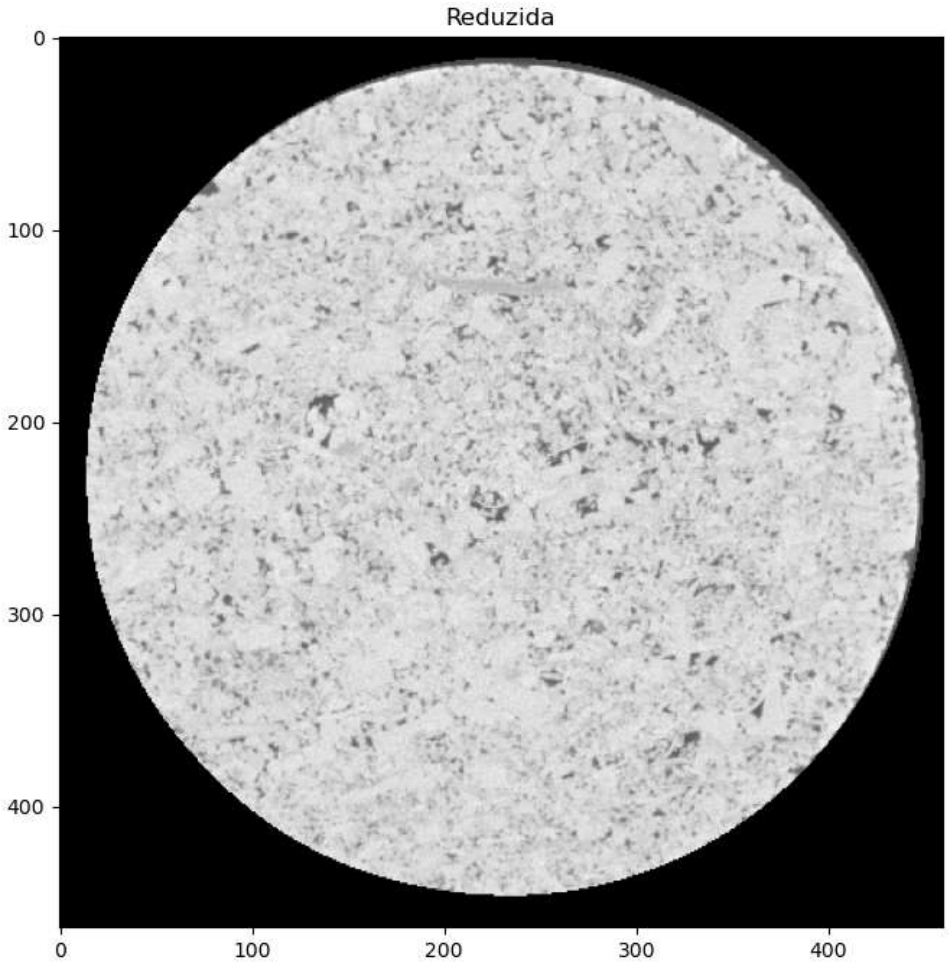
```
shape da secao original -> (925, 920)
```

In [133]:

```
secao_reduzida = secao[::2,::2]
```

In [134]:

```
show_gray(secao_reduzida, "Reduzida")
```



In [135]:

```
print("shape da secao reduzida ->", secao2.shape)
```

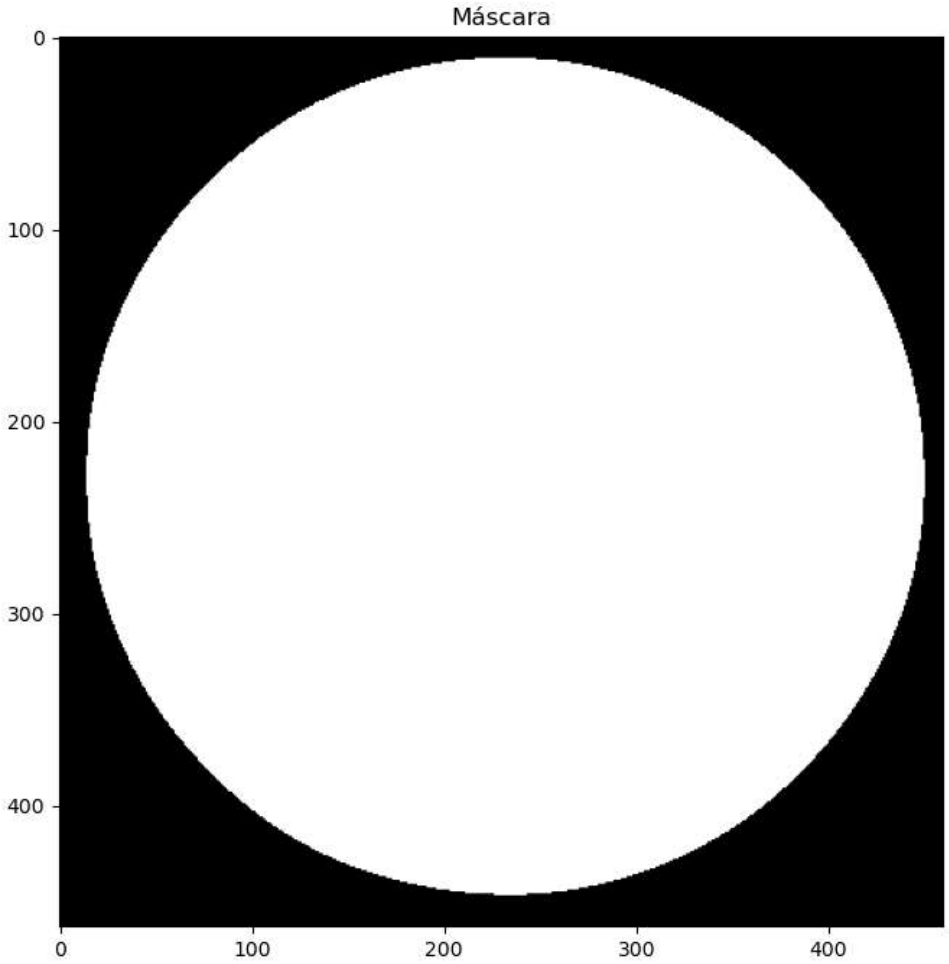
```
shape da secao reduzida -> (463, 460)
```

In [136]:

```
mascara = secao_reduzida > 0
```

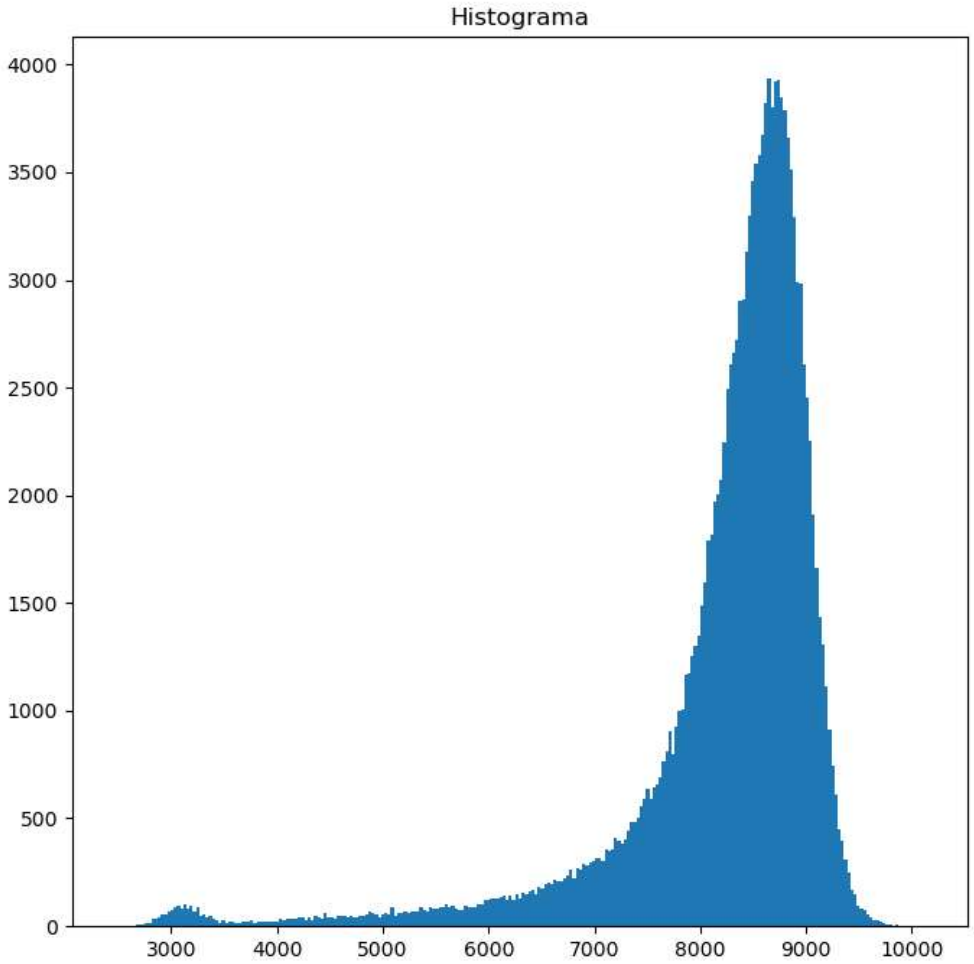
In [137]:

```
show_gray(mascara, "Máscara")
```



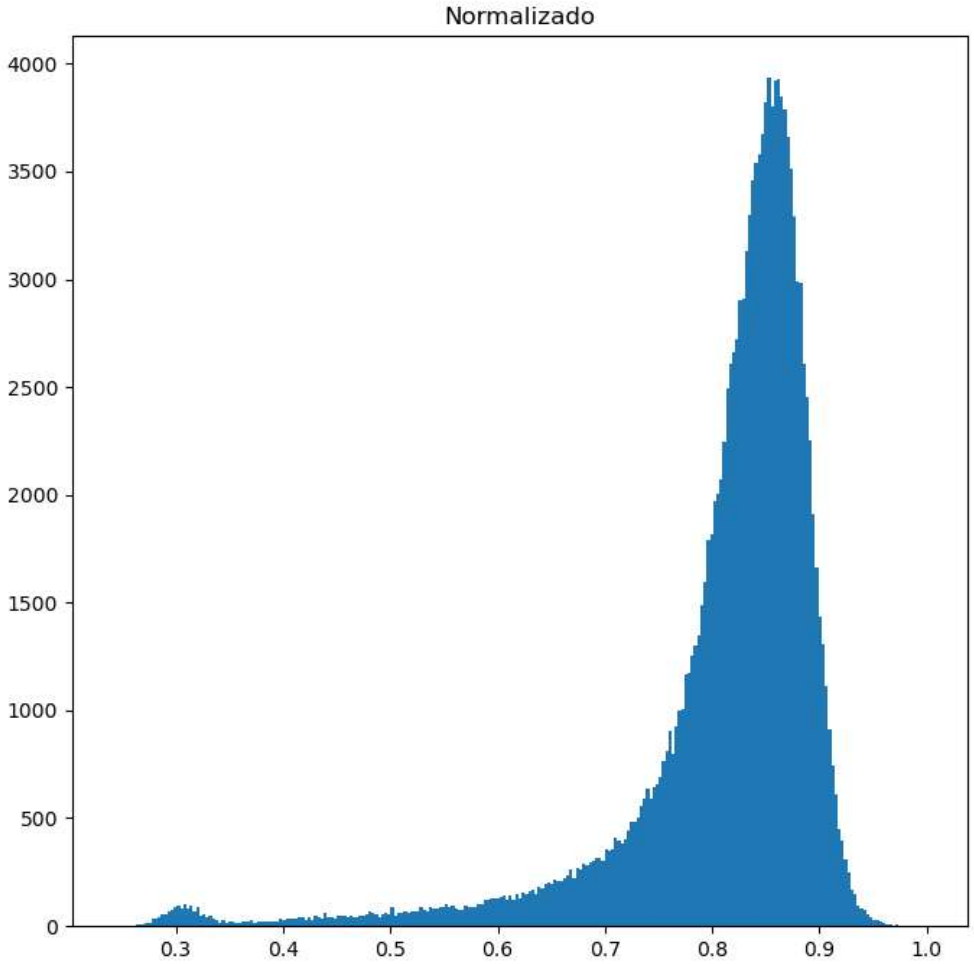
In [138]:

```
show_hist(secao_reduzida[mascara].ravel(), "Histograma")
```



In [139]:

```
secao_normalizada = secao_reduzida.astype(float)
vmax = np.amax(secao_normalizada)
vmin = np.amin(secao_normalizada)
secao_normalizada = (secao_normalizada - vmin)/(vmax - vmin)
show_hist(secao_normalizada[mascara].ravel(), "Normalizado")
```



In [140]:

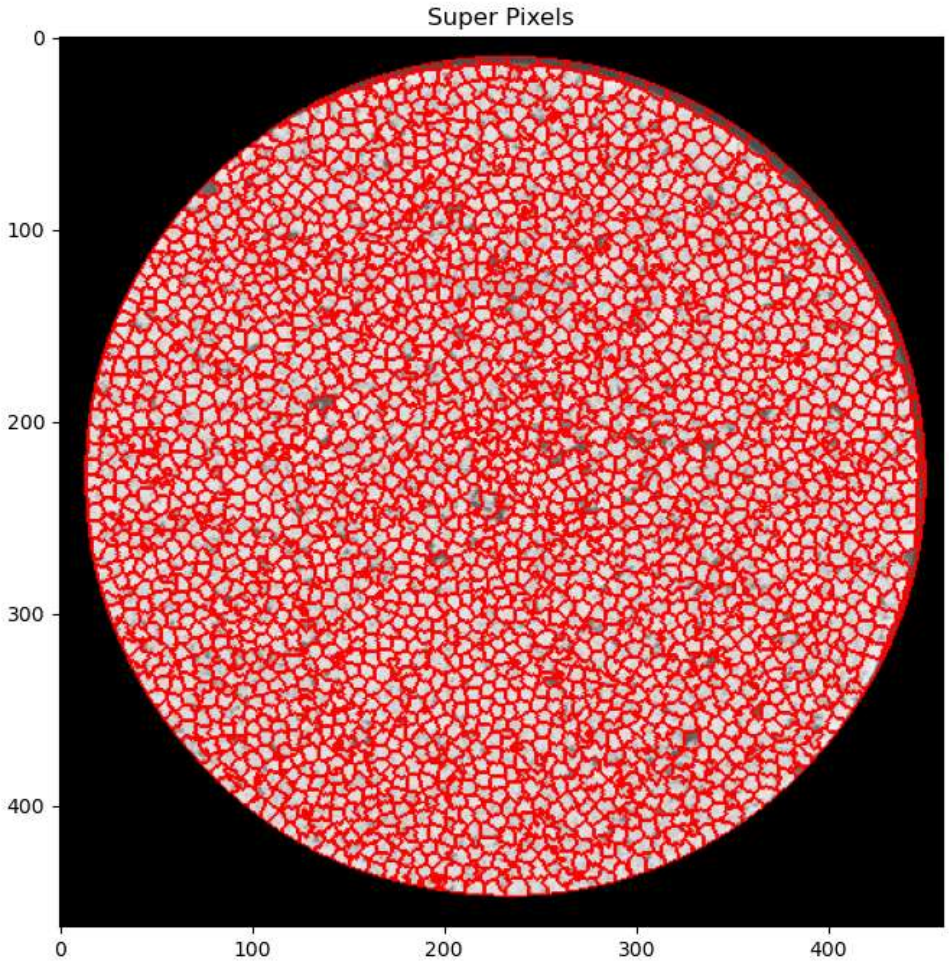
```
segmentos_1 = slic(secao_normalizada, n_segments=3000, compactness=0.06, max_iter=50, s
lic_zero=False, mask=mascara)
```

In [141]:

```
img_sp_1 = mark_boundaries(secao_normalizada, segmentos_1, (1,0,0))
```

In [142]:

```
show_rgb(img_sp_1, "Super Pixels")
```

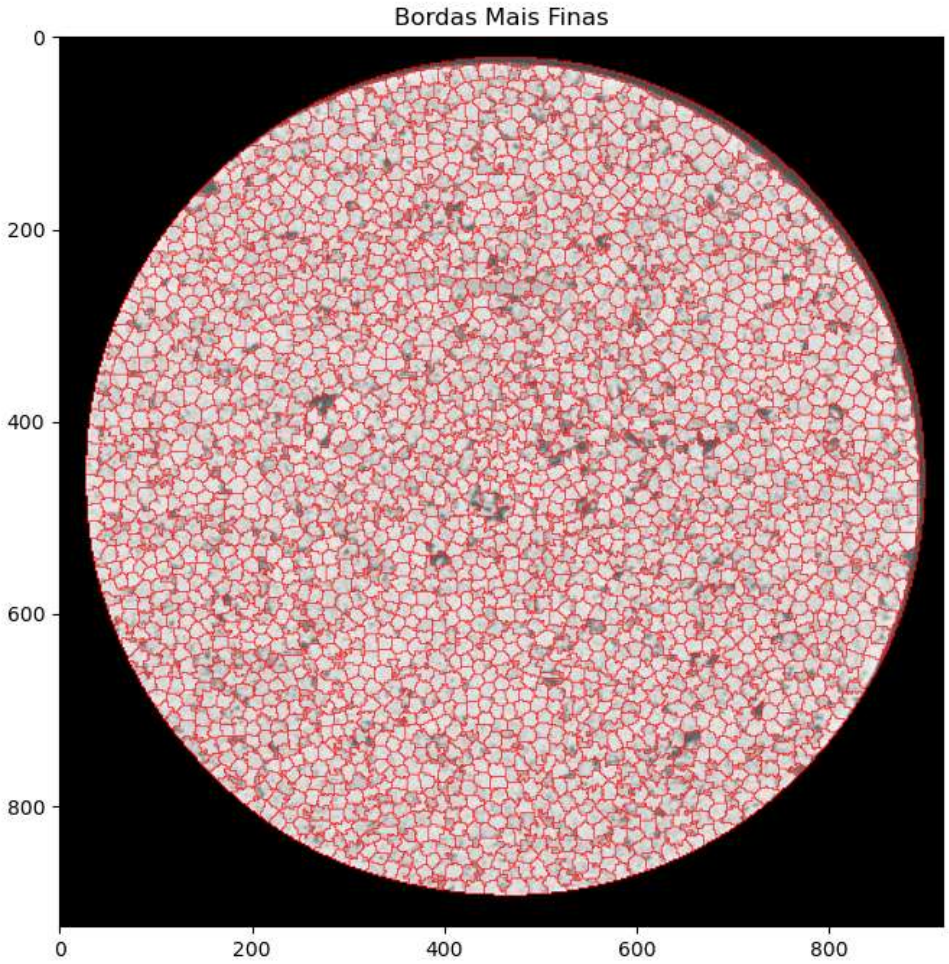


In [143]:

```
img_sp_2 = mark_boundaries(secao_normalizada, segmentos_1, (1,0,0), mode='subpixel')
```

In [144]:

```
show_rgb(np.clip(img_sp_2, a_min=0, a_max=1), "Bordas Mais Finas")
```



In [145]:

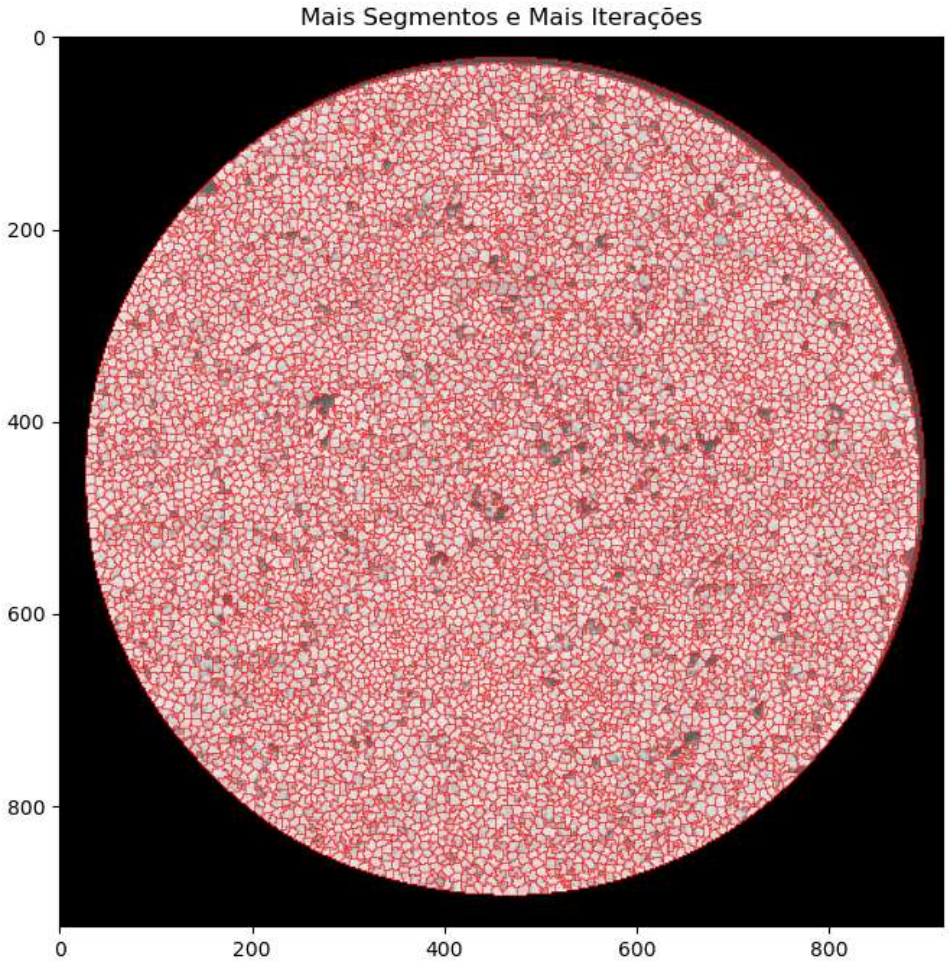
```
# mais segmentos e mais iterações
segmentos_2 = slic(secao_normalizada, n_segments=8000, compactness=0.04, max_iter=500,
slic_zero=False, mask=mascara)
```

In [146]:

```
# usa o modo subpixel para gerar as bordas
# acrescenta pixels extras na imagem para representar as bordas
img_superpixels_thinerboundaries = mark_boundaries(secao_normalizada, segmentos_2, (1,0
,0), mode='subpixel')
```

In [147]:

```
show_rgb(np.clip(img_superpixels_thinerboundaries, a_min=0, a_max=1), "Mais Segmentos e
Mais Iterações")
```



In [148]:

```
show_rgb(np.clip(img_superpixels_thinerboundaries, a_min=0, a_max=1), "Com Zoom")
```