

# SAFMIs: Segmented Atomic Force Microscope Images

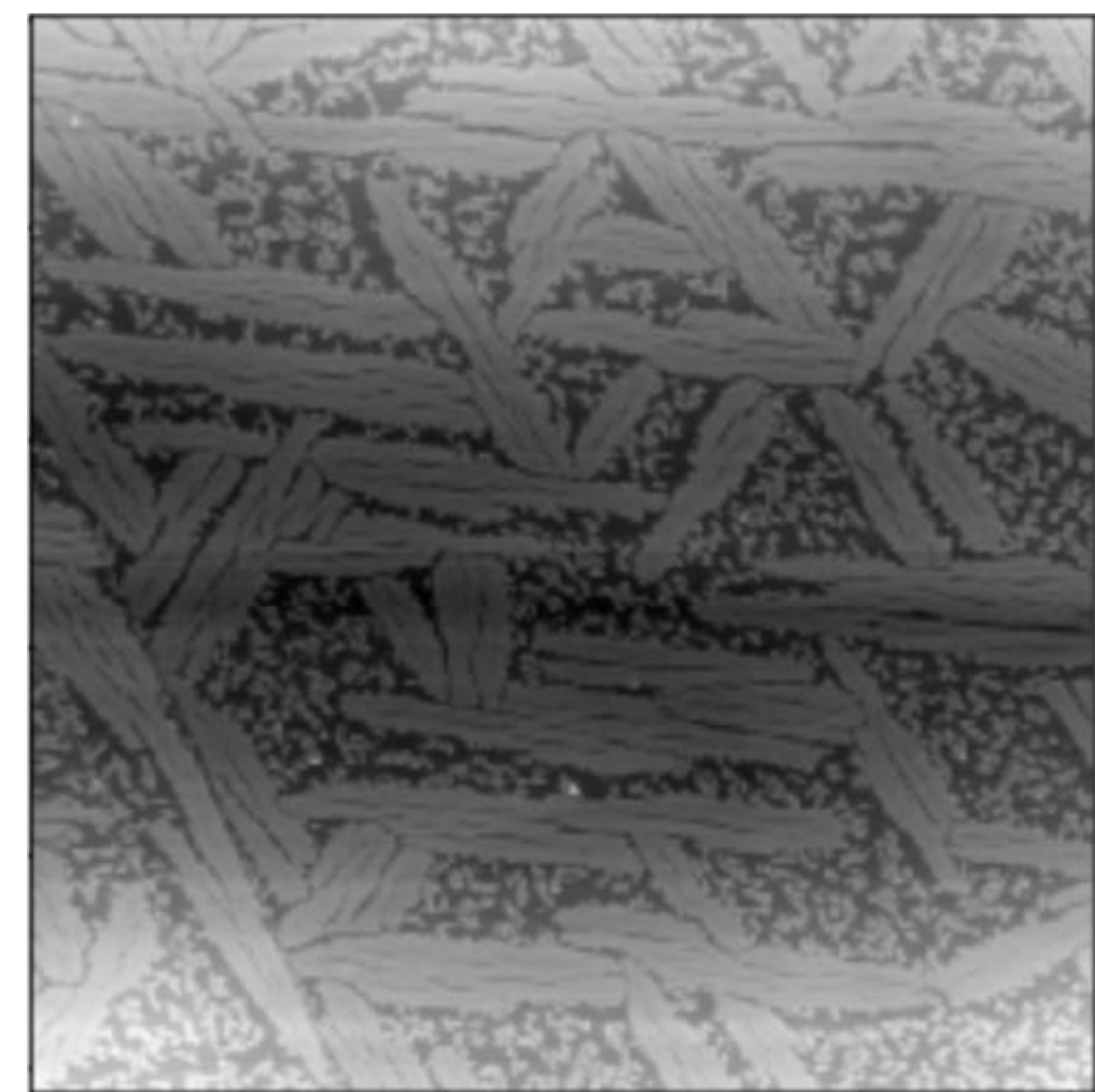
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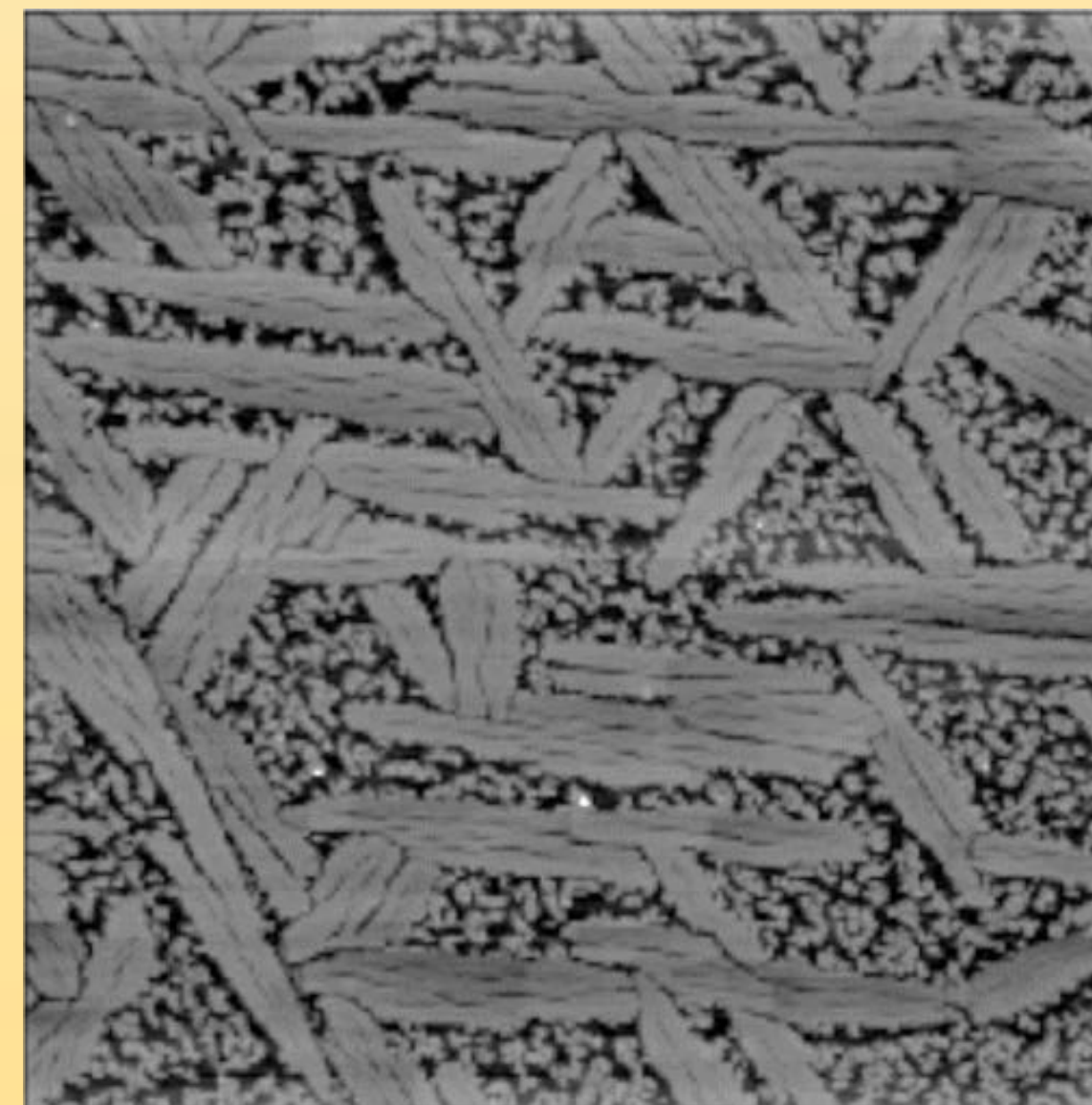
## Background Subtraction

The background approximation and subtraction function uses Morphological Filtering from scikit-image. It returns all bright spots in the image that are smaller than the structuring element that the user defines (rectangular, square or ellipsoidal/circular). It outputs a foreground with some threshold, deletes the background, while preserving the relative height values to use later.



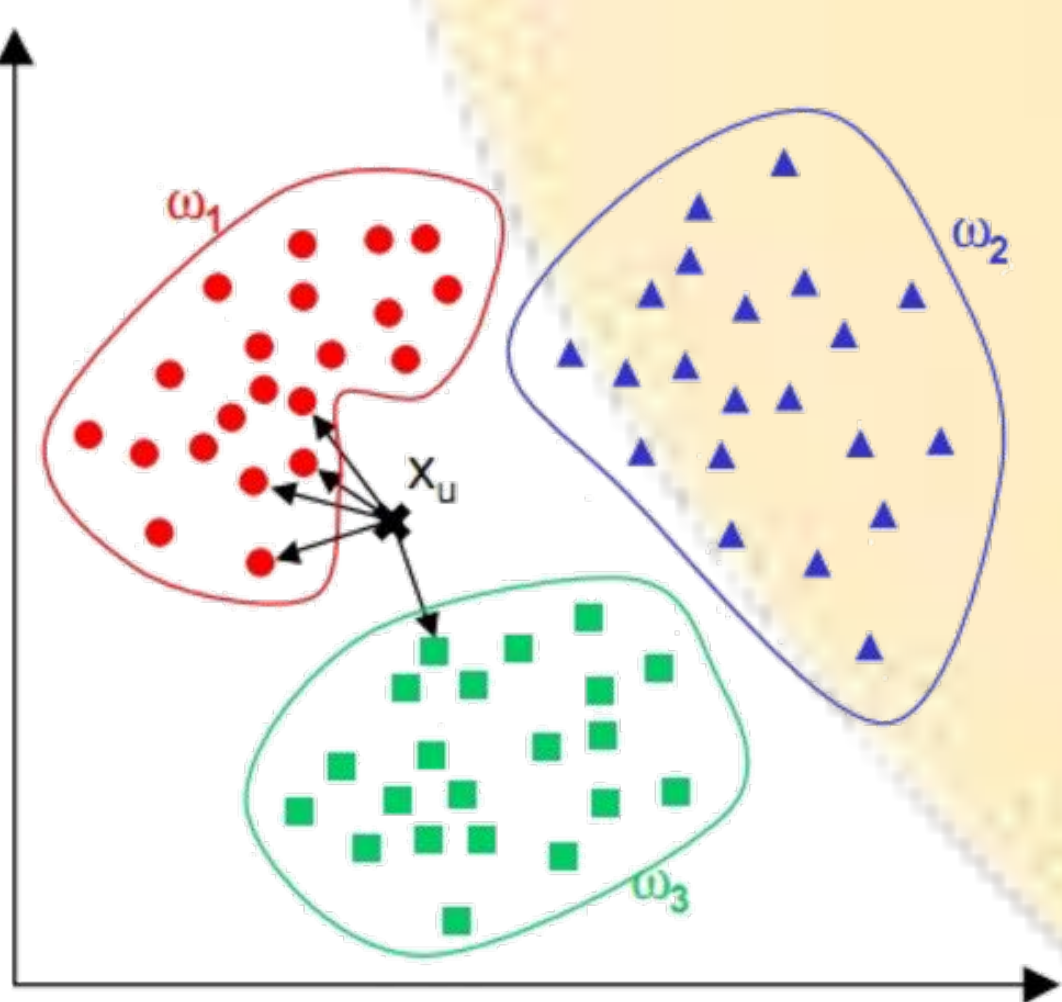
## Image Segmentation: Random Walk

Random walker segmentation from scikit-image was employed for this step. Random walk solves an anisotropic diffusion equation with tracers starting from a pre-determined pixel with a certain label (initial marker position). Diffusivity is high, if neighboring pixels have similar values, whereas widely varying pixels values results in low diffusion. Thus, diffusion has an inverse relationship to the gradient height.



## Prediction of Bio/Nano Interface Parameters using KNN Clustering and Regression

K-Nearest Neighbor Clustering was performed on 50 images where a random test/train split was performed. Images were clustered based on pH and concentration of the peptide solution used to create the bio-interface observed under AFM. Next, regression was used to predict order/disorder ratio and percent coverage for a given input AFM image with the same clustering parameters.



## Generation of Image Descriptors from Segmented Images

Percentile Filter from scikit-ndimage module allowed for separation of ordered and disordered ratios. Furthermore, a percent coverage was calculated; these two parameters are image descriptors that are specific to the experimental conditions of the surface under the microscope

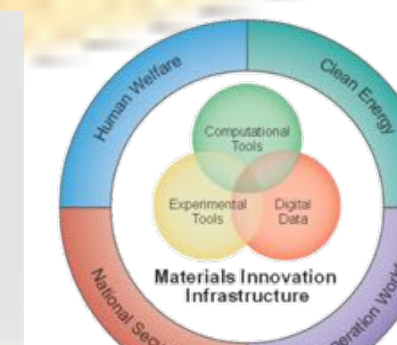


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Images provided by:  
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