IAPP Surface-Induced Aggregation and Corilagin's Inhibitory Effect

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Supporting information (SI)

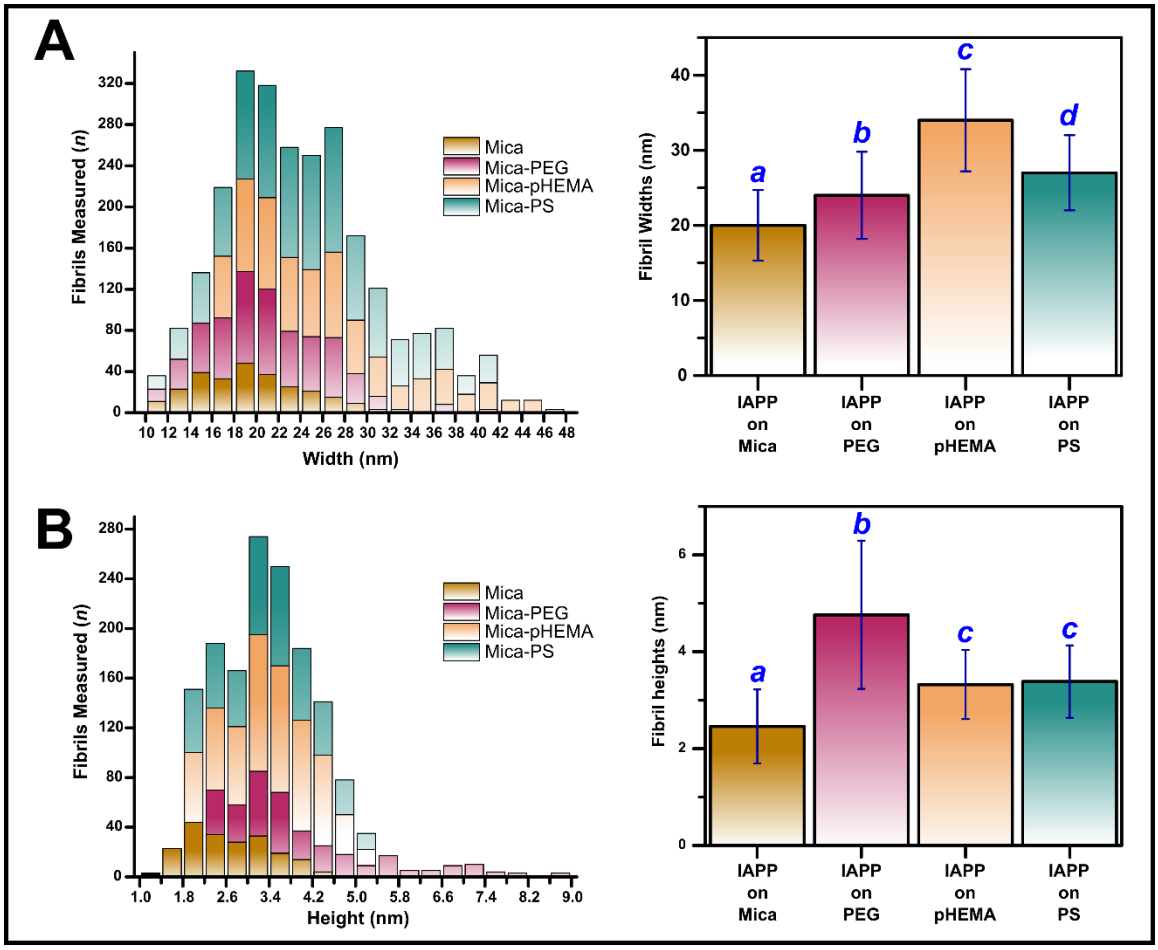

Figure S1. Individual surface-induced self-assembled 1 μM IAPP fibrils on Mica, Mica-PEG, Mica-pHEMA, and Mica-PS AFM/PiFM images were used to measure average widths of 19.8 ± 4.8 nm (n = 265), 23.9 ± 5.8 nm (n = 268), 34.1 ± 6.9 nm (n = 259), and 27.0 ± 5.0 nm (n = 271) (**A**), and heights of 2.46 ± 0.77 nm (n = 202), 4.76 ± 1.53 nm (n = 164), 3.32 ± 0.71 nm (n = 155), and 3.38 ± 0.75 nm (n = 167) (**B**). The width and height ANOVA tests yielded F-statistics of 262.25 and 191.40, respectively, with p-values less than 0.001, indicating a statistical difference in fibril widths and heights among the groups. The analysis revealed statistically significant differences in fibril widths among all groups (p < 0.05) for all pairwise comparisons), indicating that each treatment group differed significantly from the others. Pairwise fibril height statistical comparisons indicated that all groups, except for IAPP on pHEMA and IAPP on PS, were statistically dissimilar (p < 0.05). Groups are denoted as *a*, *b*, *c*, and *d*. Statistically equivalent groups are labeled with the same letter.

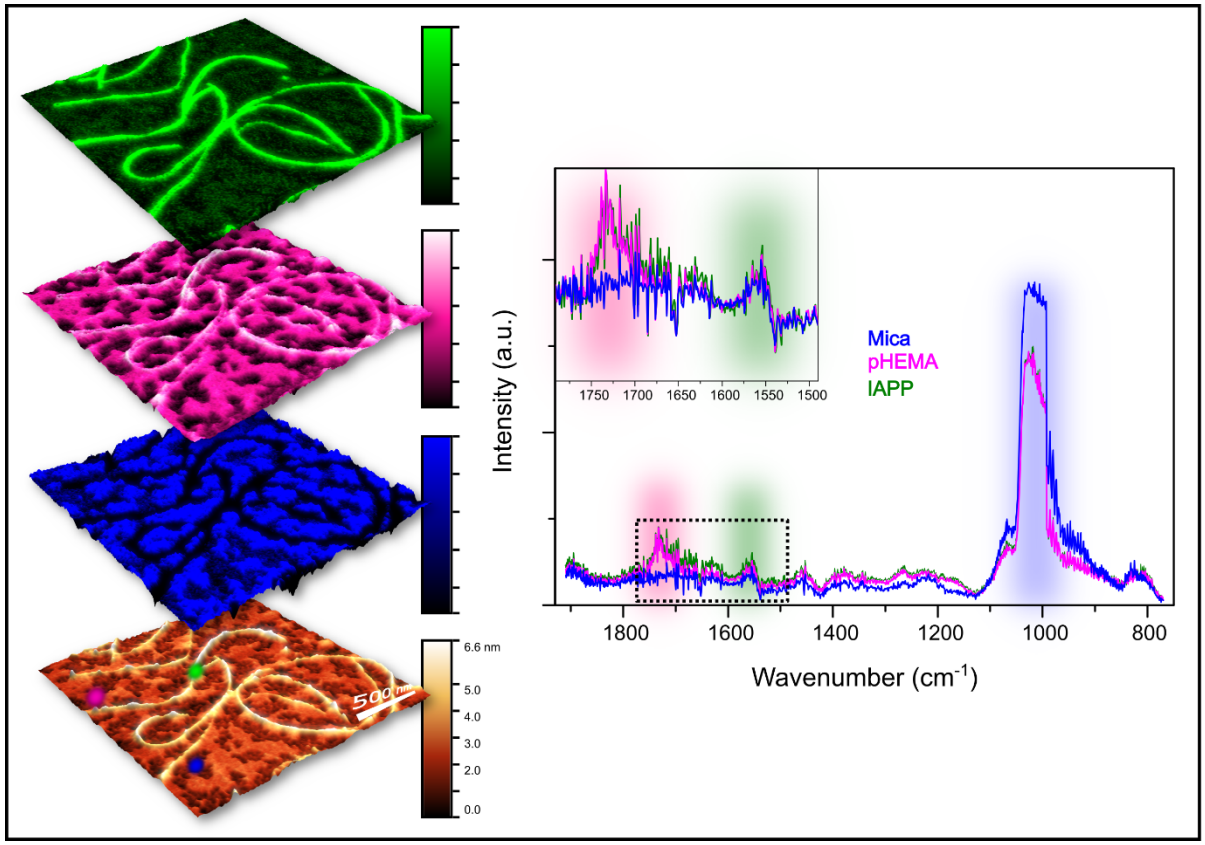

Figure S2. With PiFM, we were able to segregate three chemical entities from a single topography scan. Although the topography image showed various morphological features, PiFM isolated and corresponded the features to either IAPP (green), pHEMA (pink) or MICA (blue). The difficulty with pHEMA was caused by an apparent disruption and wrapping of the polymer around the IAPP fibrils, thus making the study on this surface subject to unpredictable variabilities. Because we found that IAPP fibril formation was entangling with and between the pHEMA coating, we opted to discard this surface from further experiments in this study.

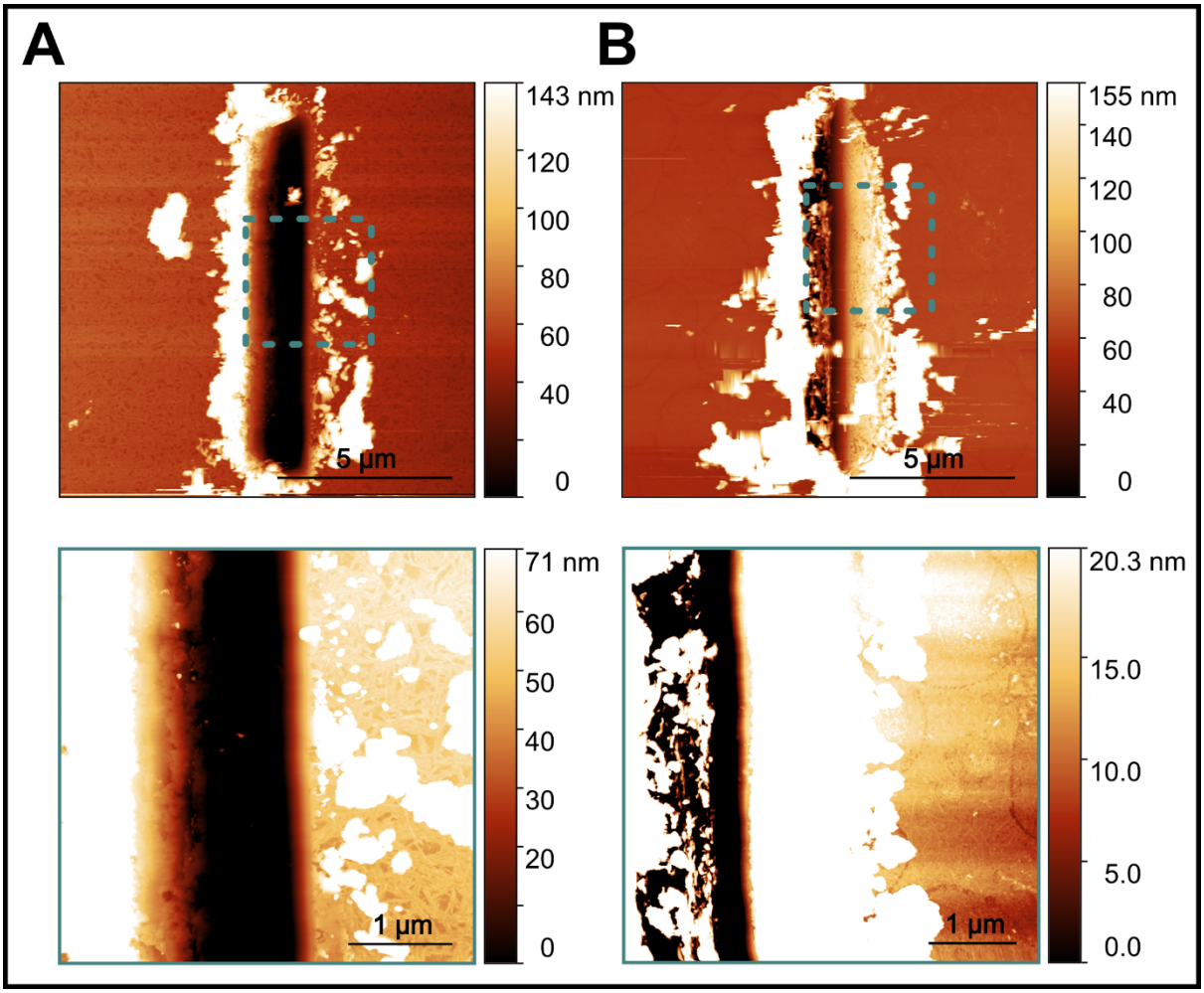

Figure S3. AFM tip-scratch tests were done on the 10 µM IAPP loaded samples on bare Mica surface without (**A**) and with (**B**) the inclusion of 400 µM polyphenol corilagin during the 72 h incubation. In either condition, a thick fibril deposition of (61.9 ± 1.2 nm and 38.8 ± 0.8 nm, respectively) multi-layered surface-assembled IAPP was measured. This test showed that corilagin was unable to significantly interfere with the surface induced assembly of IAPP amyloid fibrils on the bare Mica surface.

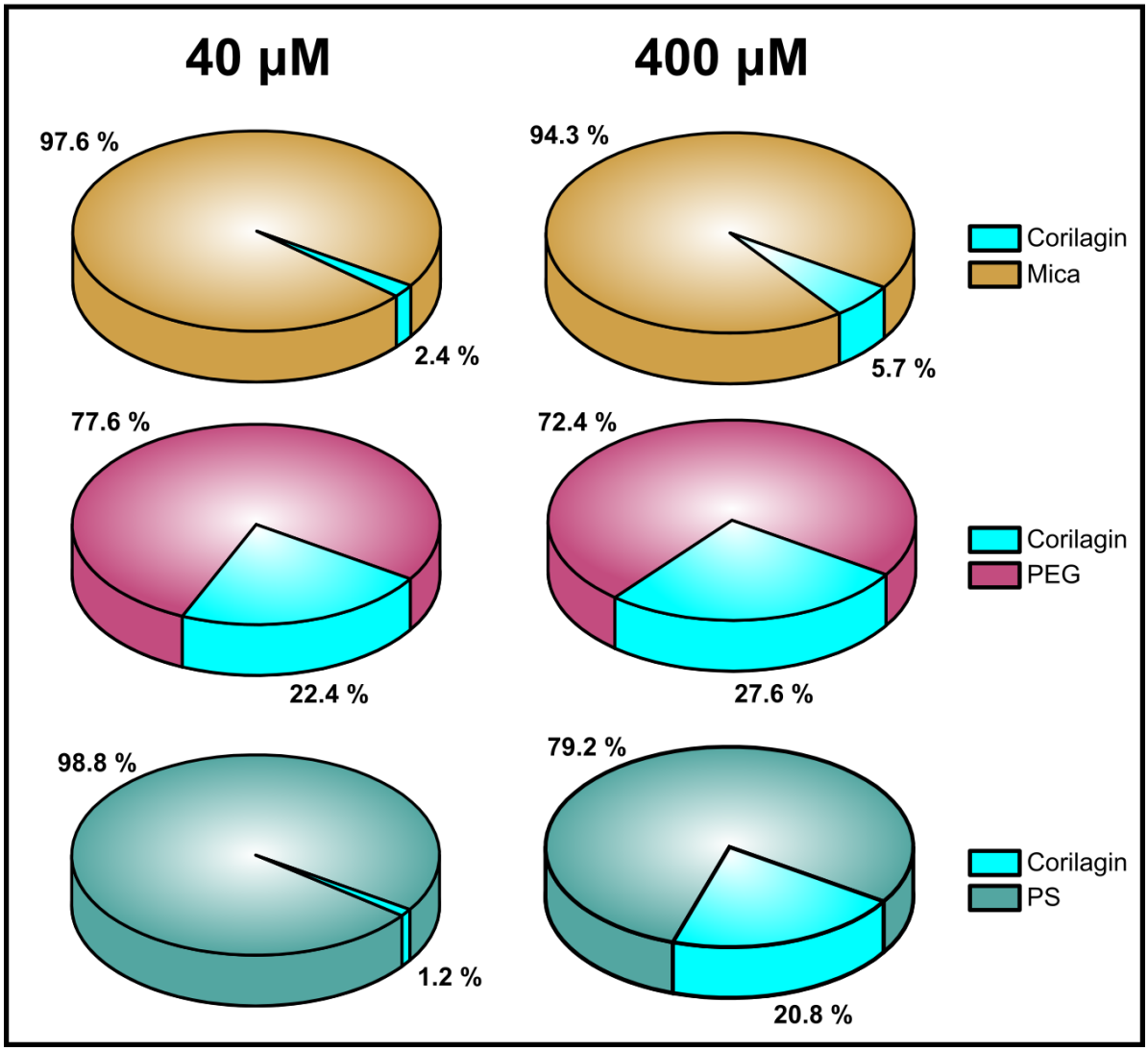

Figure S4. AFM image statistics were used to calculate the surface coverage of 40 µM and 400 µM corilagin on Mica, Mica-PEG and Mica-PS after incubation, in the absence of IAPP monomers. Mica and Mica-PEG surfaces showed substantially less variations (3.3% and 5.2%, respectively) than Mica-PS surface (19.6%) accounting for the inhibitory effects on IAPP surface induced fibril assemblies.

Table S1. Comparison of surface content by theoretical and calculated quantification of corilagin.

Corilagin added				
Type of surfaces	Theoretical estimates		Calculated surface Area	
	40 μM	400 μM	40 μM	400 μM
Mica	7.5×10^{18} Molecules/m^2 1.2 mg/m^2	7.5×10^{19} Molecules/m^2 12.1 mg/m^2	2.4 % ± 0.36	5.7 % ± 1.38
PEG			22.4 % ± 0.74	27.6 % ± 1.06
PS			1.2 % ± 0.49	20.8 % ± 6.16