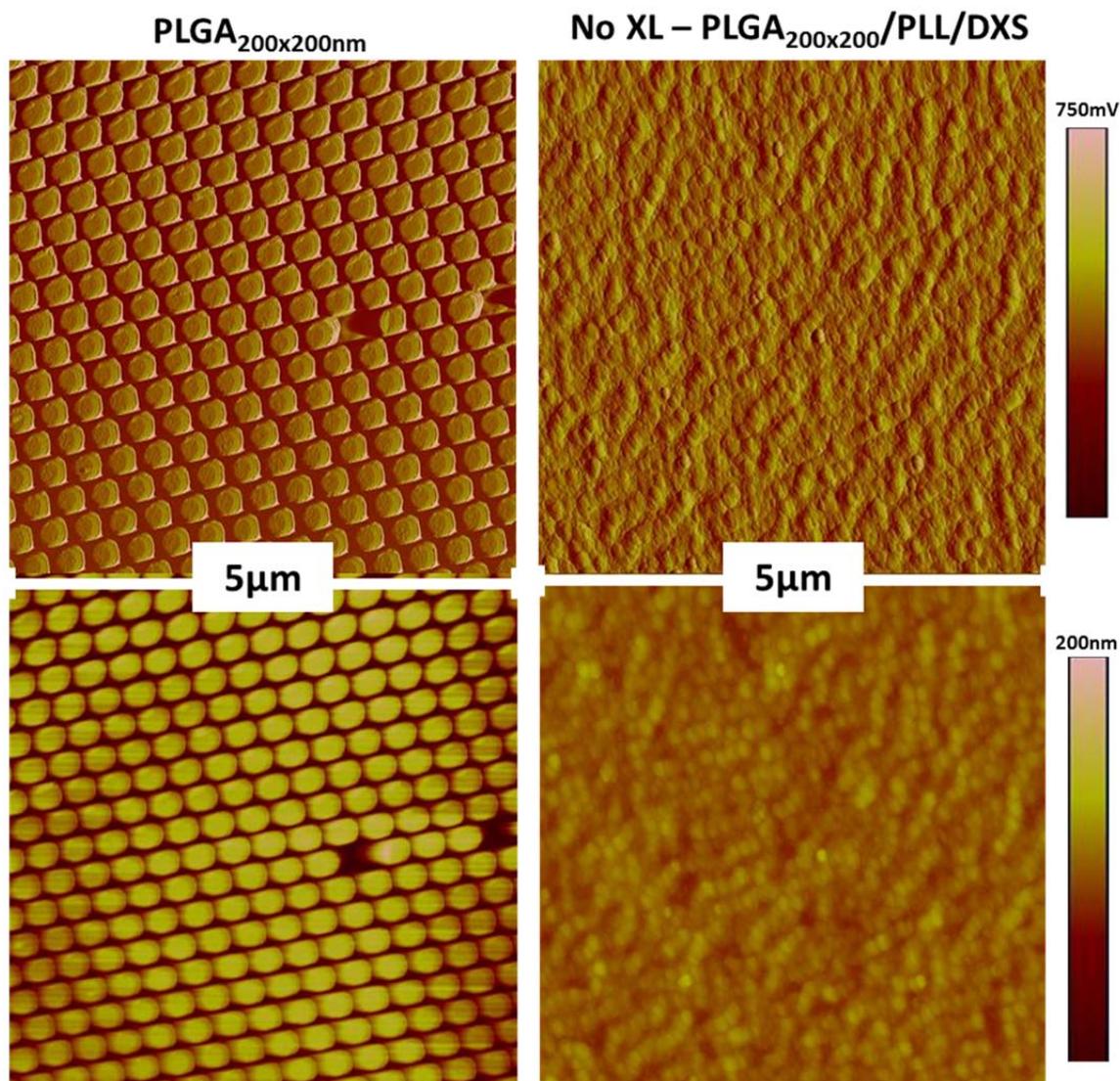


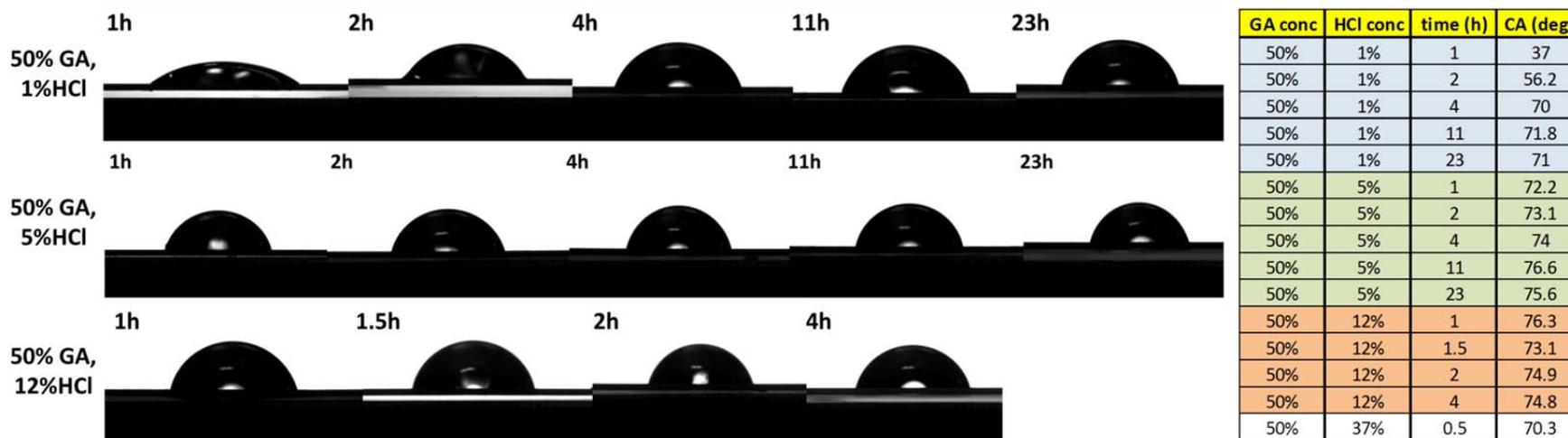
**Scalable Manufacture of Built-to-Order Nanomedicine: Spray-assisted Layer-by-Layer Functionalization of PRINT® Nanoparticles**

*Stephen W. Morton, Kevin Herlihy, Kevin E. Shopsowitz, Jason Deng, Kevin Chu, Charles Bowerman, Joseph M. DeSimone\*, and Paula T. Hammond\**

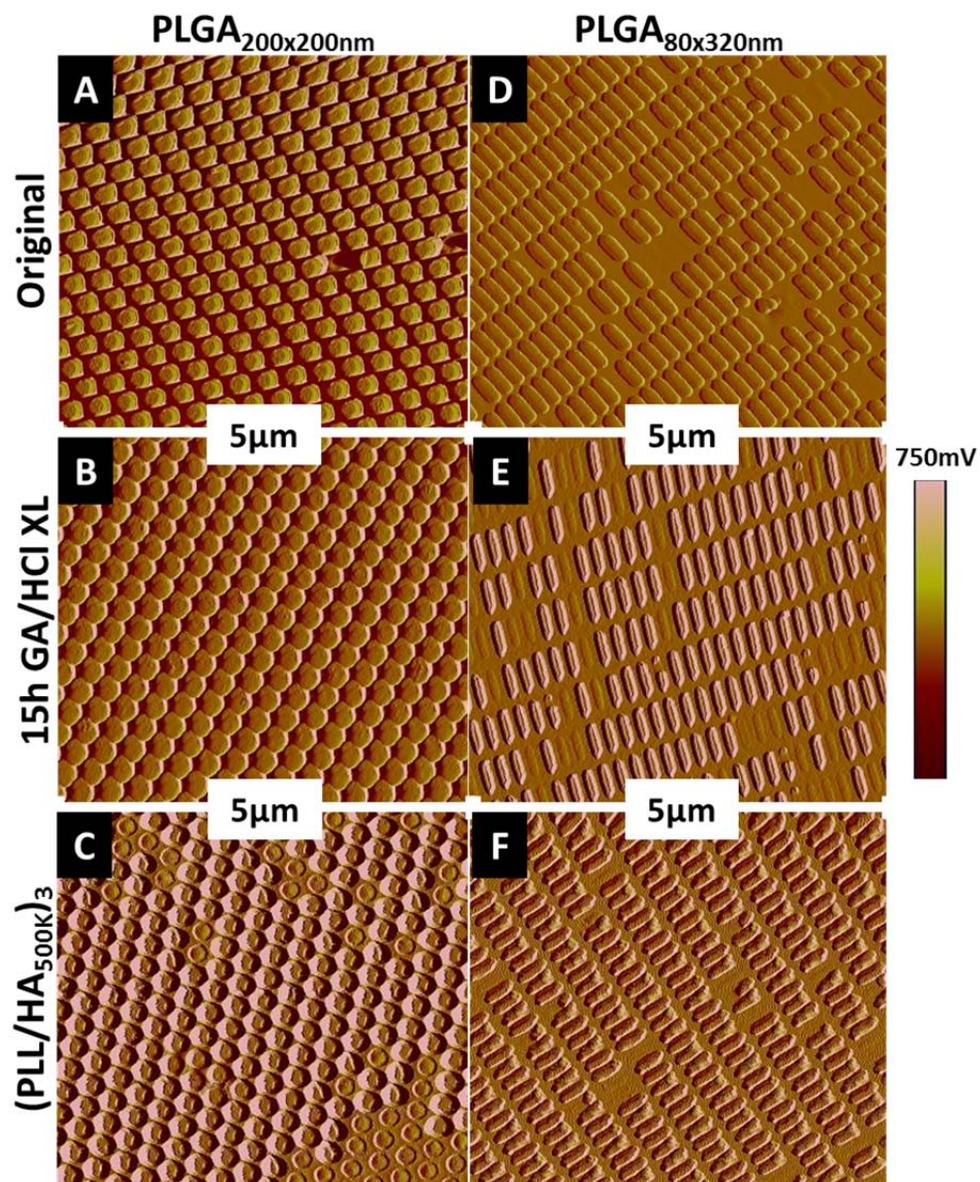
**Supplementary Data.**



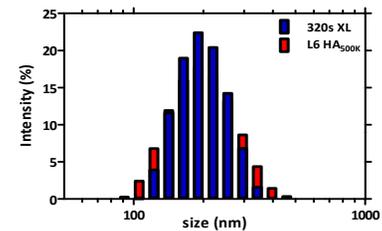
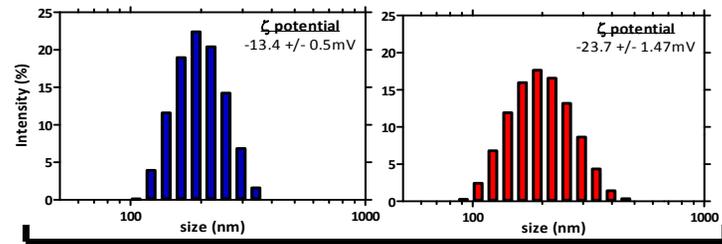
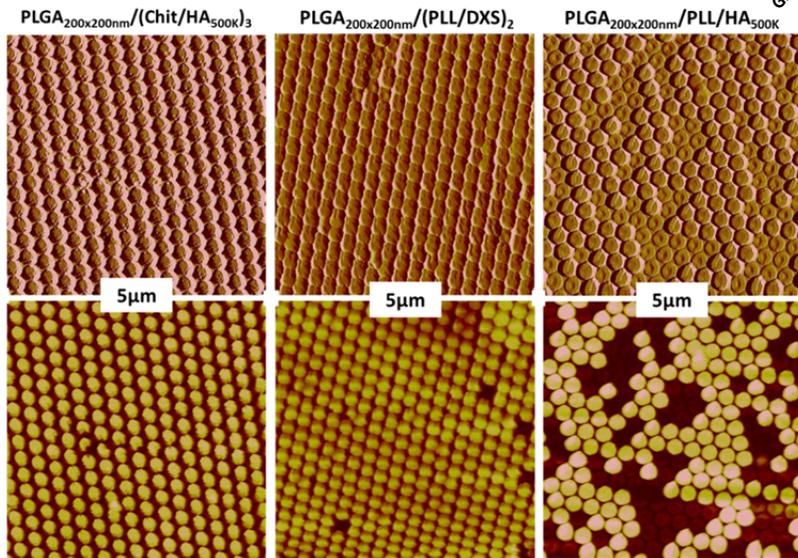
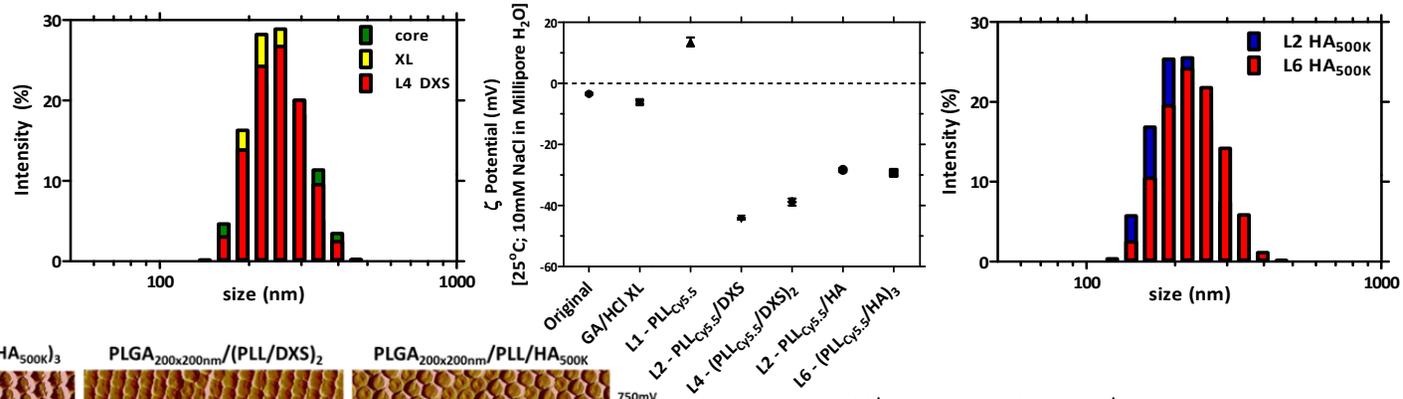
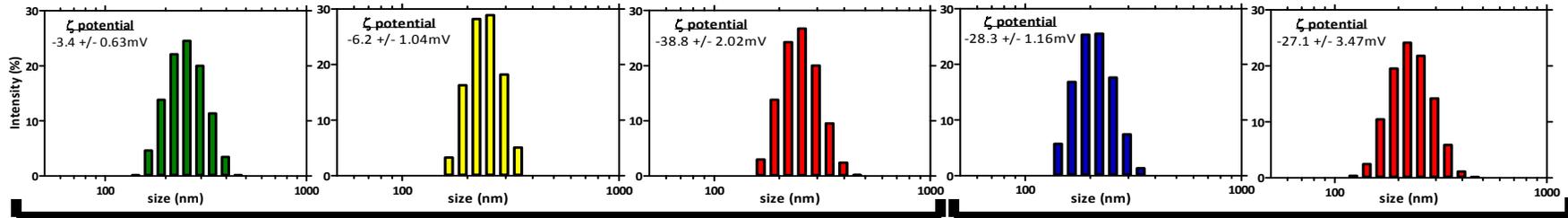
**Supplemental Figure 1.** Particles washed off following deposition (**right**) on non-crosslinked harvested particle array (**left**).



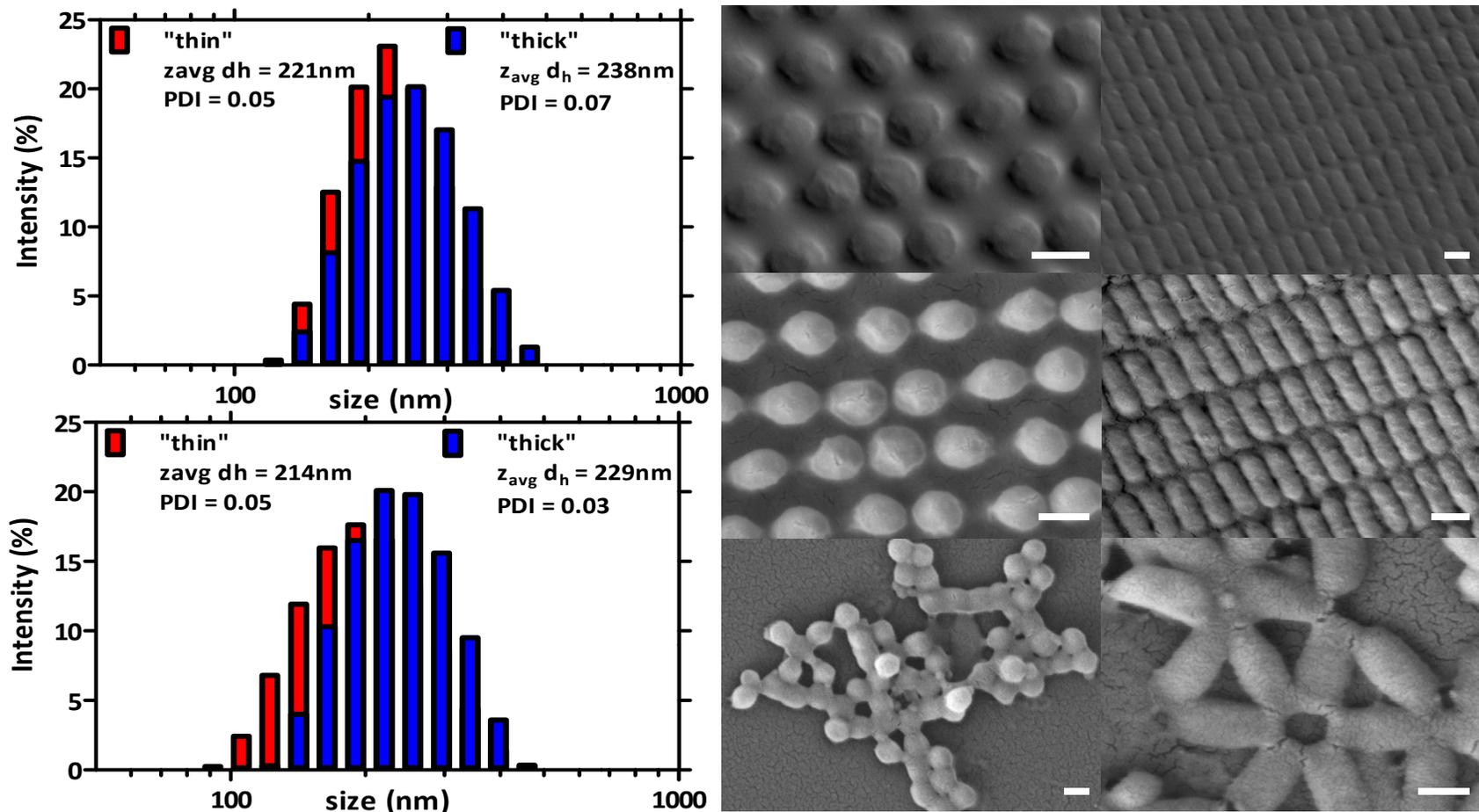
**Supplemental Figure 2. Varying crosslinking conditions, incubation period – characterization of crosslinking PVA via contact angle measurements.** Crosslinking at 37% HCl results in significant loss of particles beyond 0.5h (which was also found not to be long enough to maintain particles during functionalization), presumably due to acid-catalyzed hydrolysis of PLGA, therefore no data shown for this sub-optimal crosslinking condition.



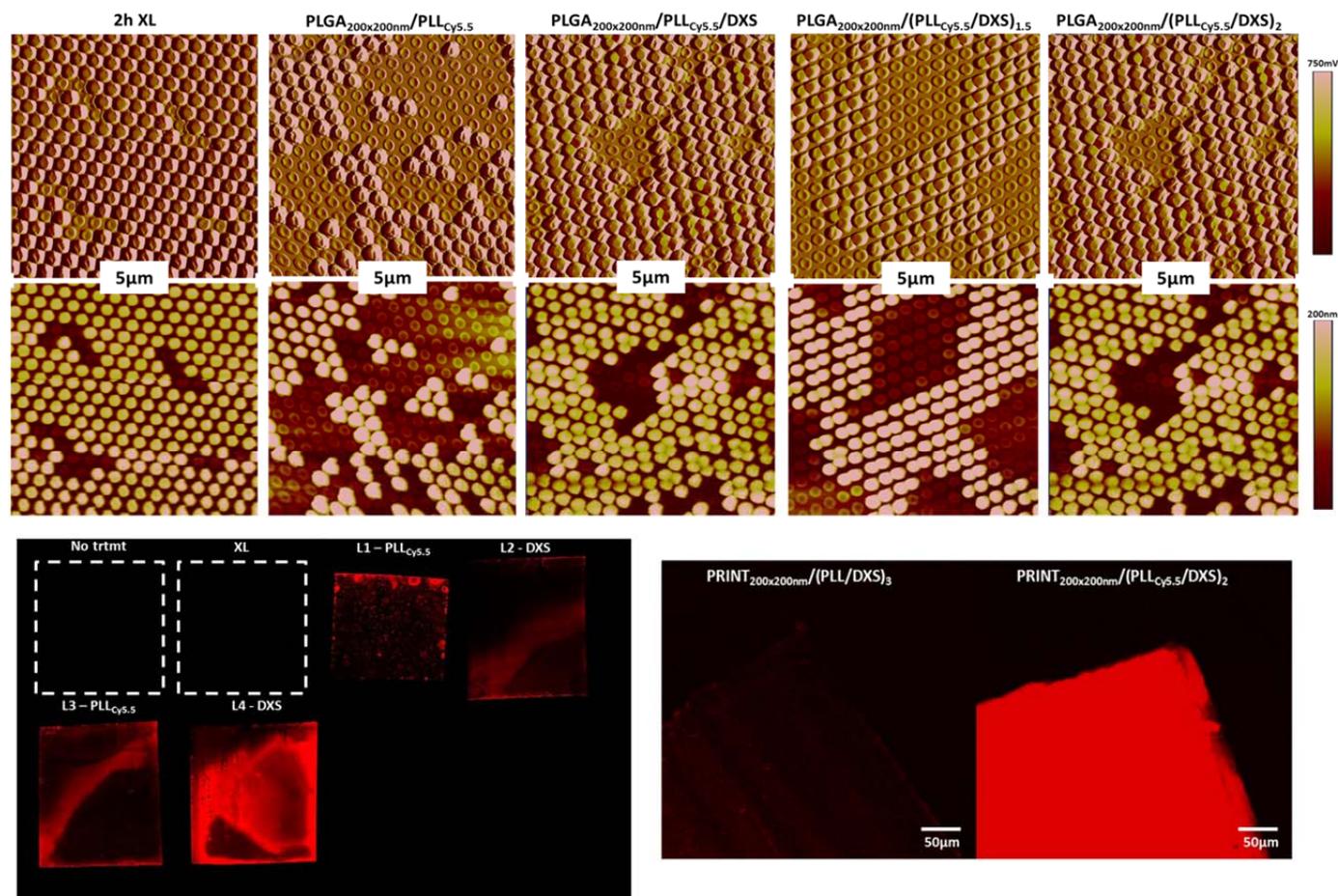
Supplemental Figure 3. AFM amplitude data corresponding to Figure 3.



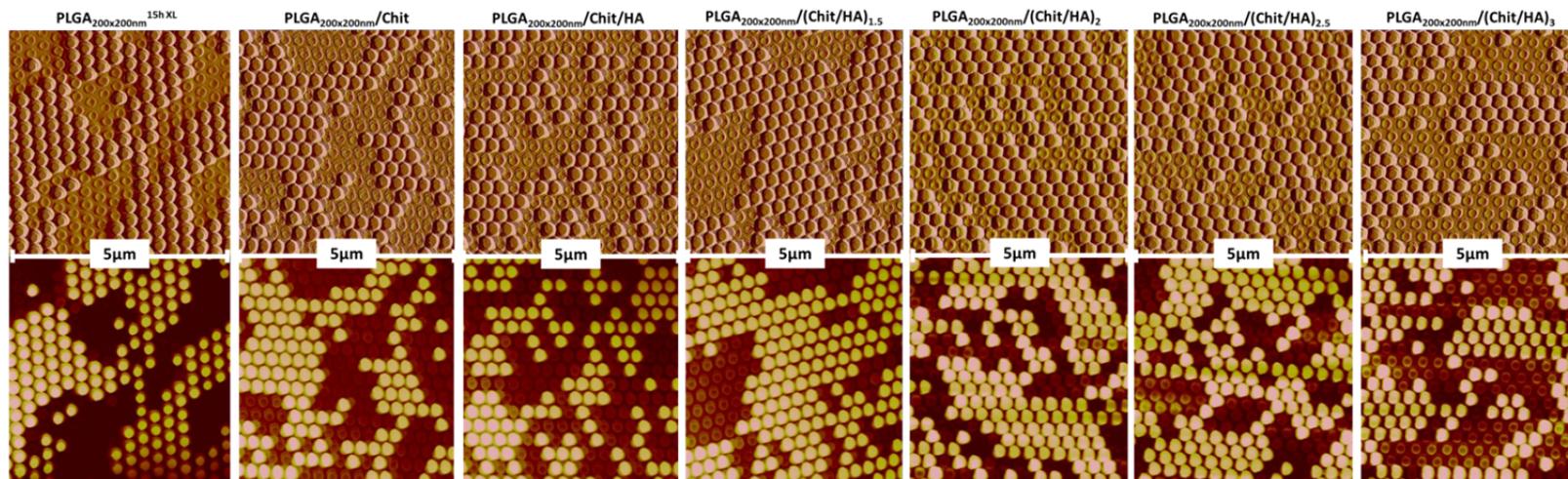
**Supplemental Figure 4. Dynamic Light Scattering (DLS) Intensity distribution histograms displayed throughout Spray-LbL deposition on PRINT® PLGA<sub>200x200nm</sub> nanoparticles.  $\zeta$ -potential analysis ran concurrently with DLS characterization.**



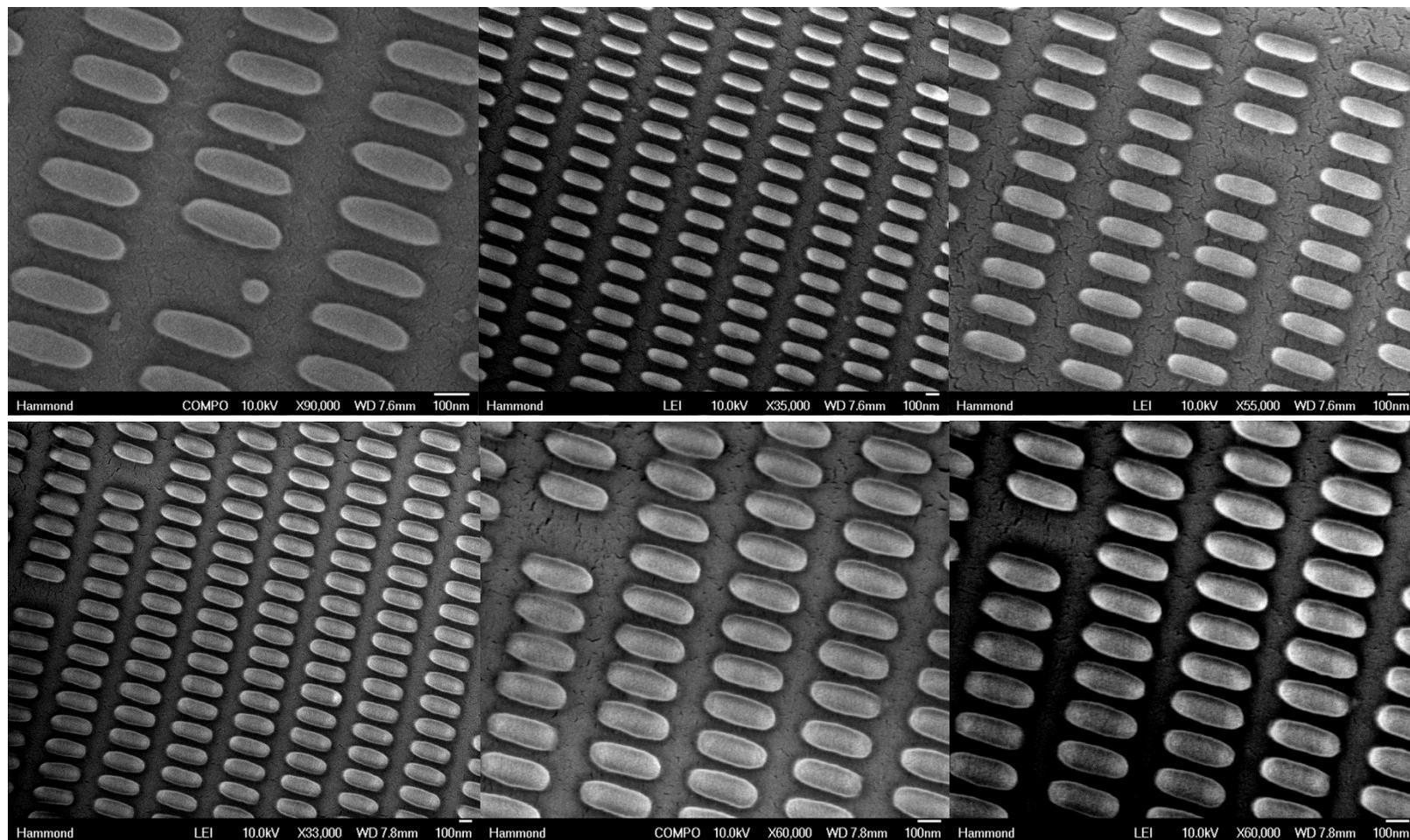
**Supplemental Figure 5. Controlling film thickness.** (top, left) Overlay of coated PRINT® PLGA 200x200nm particles with “thin” [(PLL/HA)<sub>3</sub>] and “thick” [(Chit/HA)<sub>5</sub>] coatings. (bottom, left) Overlay of coated PRINT® PLGA 80x320nm particles with “thin” [(PLL/HA)<sub>3</sub>] and “thick” [(Chit/HA)<sub>5</sub>] coatings. (right) Coated (Chit/HA)<sub>5</sub> 200x200nm and 80x320nm PLGA particle arrays and subsequent harvested and purified coated NPs.



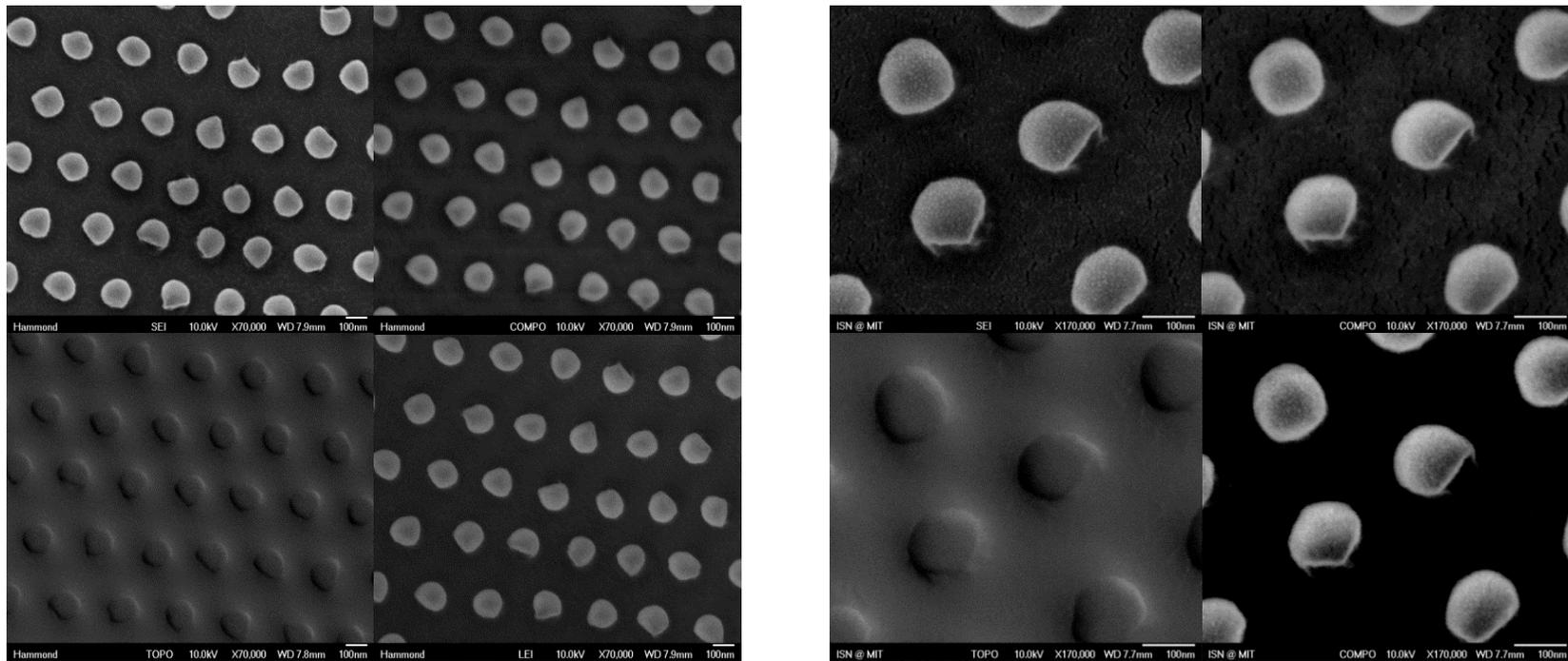
**Supplemental Figure 6. Tracking deposition with Spray-LbL on PRINT® using AFM, fluorescence imaging. (top) AFM of each layer on PRINT® from crosslinked particles (2h) to L4 (PLL/DXS)<sub>2</sub>. (bottom) fluorescence imaging using LiCor (left) and confocal microscopy (right) to track PLL<sub>Cy5.5</sub> deposition.**



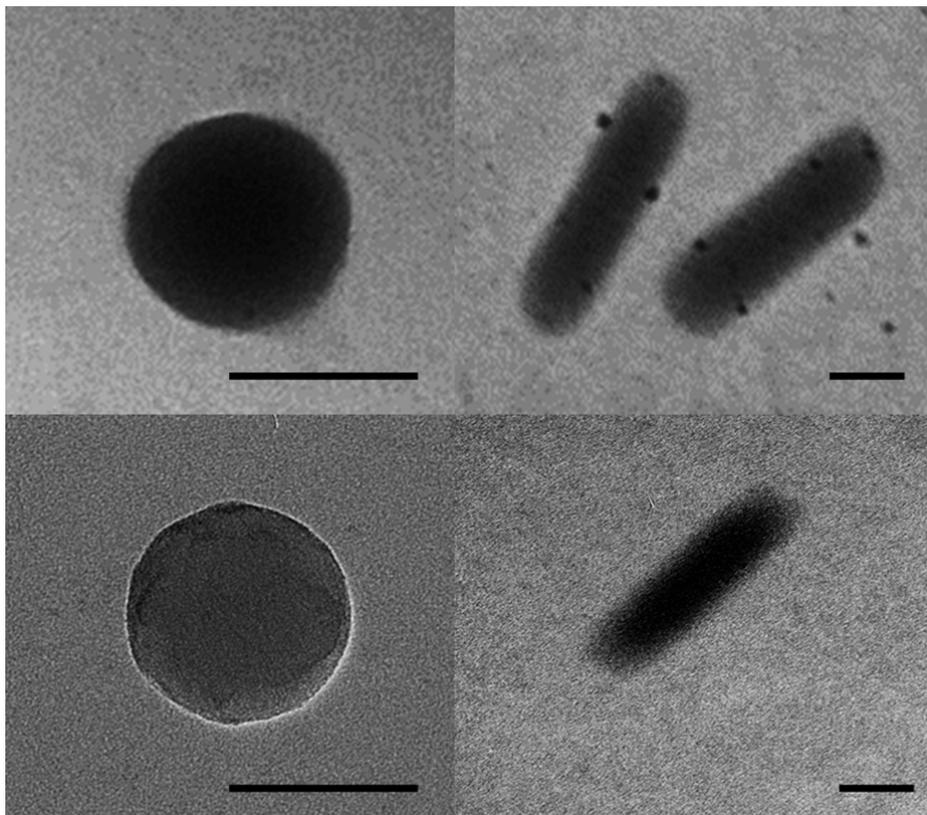
**Supplemental Figure 7. Varying polycationic component in film – Chitosan.** Tracking deposition of each layer via AFM in a 3 bilayer, Chitosan/HA Spray-LbL film. 200x200nm particle arrays were crosslinked for 15h prior to functionalization.



**Supplemental Figure 8. Spray-LbL on PRINT® PLGA<sub>80x320nm</sub> NPs. (top) uncoated, pre-crosslinked 80x320 PLGA particle arrays. (bottom) coated (PLL/HA)<sub>3</sub> 80x320 PLGA particle arrays.**



**Supplemental Figure 9. Spray-LbL on PRINT® PLGA<sub>200x200nm</sub> NPs. (left) Uncoated, pre-crosslinked PRINT® PLGA 200x200nm particle arrays. (right) Coated (PLL/HA)<sub>3</sub> 200x200 PLGA particle arrays.**



**Supplemental Figure 10.** Uncoated, pre-crosslinked (A) PRINT® PLGA200x200nm NPs and (B) PLGA80x320nm systems as visualized under TEM.