

Supplementary data for

Assembly of virus detecting proteins on simple, gold nanoparticle-glass biosensor surfaces

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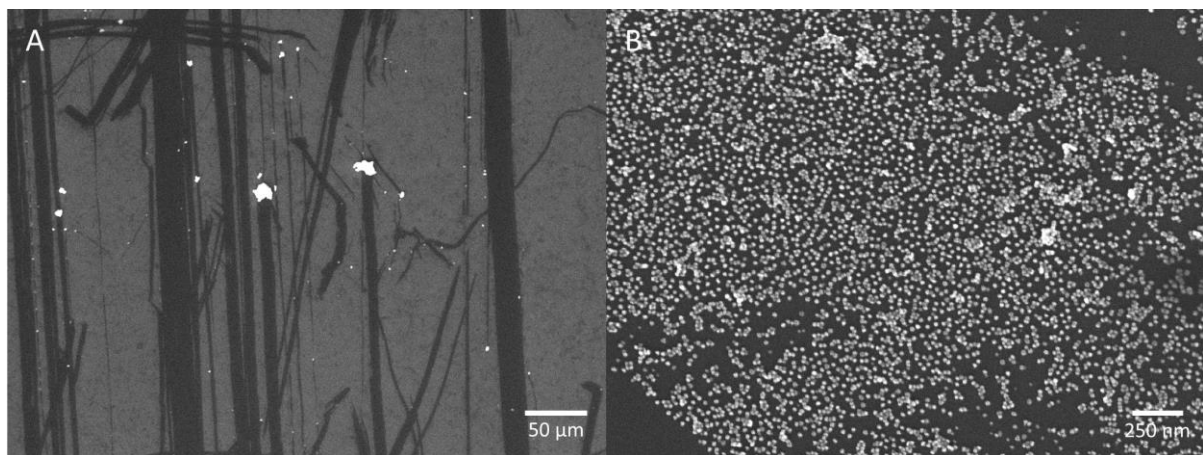


Figure S1 SEM images of the surface of the silicon block after neutron reflectometry experiments with assembled AuNPs and protein arrays. (A) A low magnification (862x) image of the silicon block surface showing significant damage to the assembled AuNPs during transportation from the beamline to the electron microscopy facility. (B) A high magnification image of one of the intact nanoparticle areas demonstrating that a high density of AuNPs remained after protein assembly on the AuNP surface.

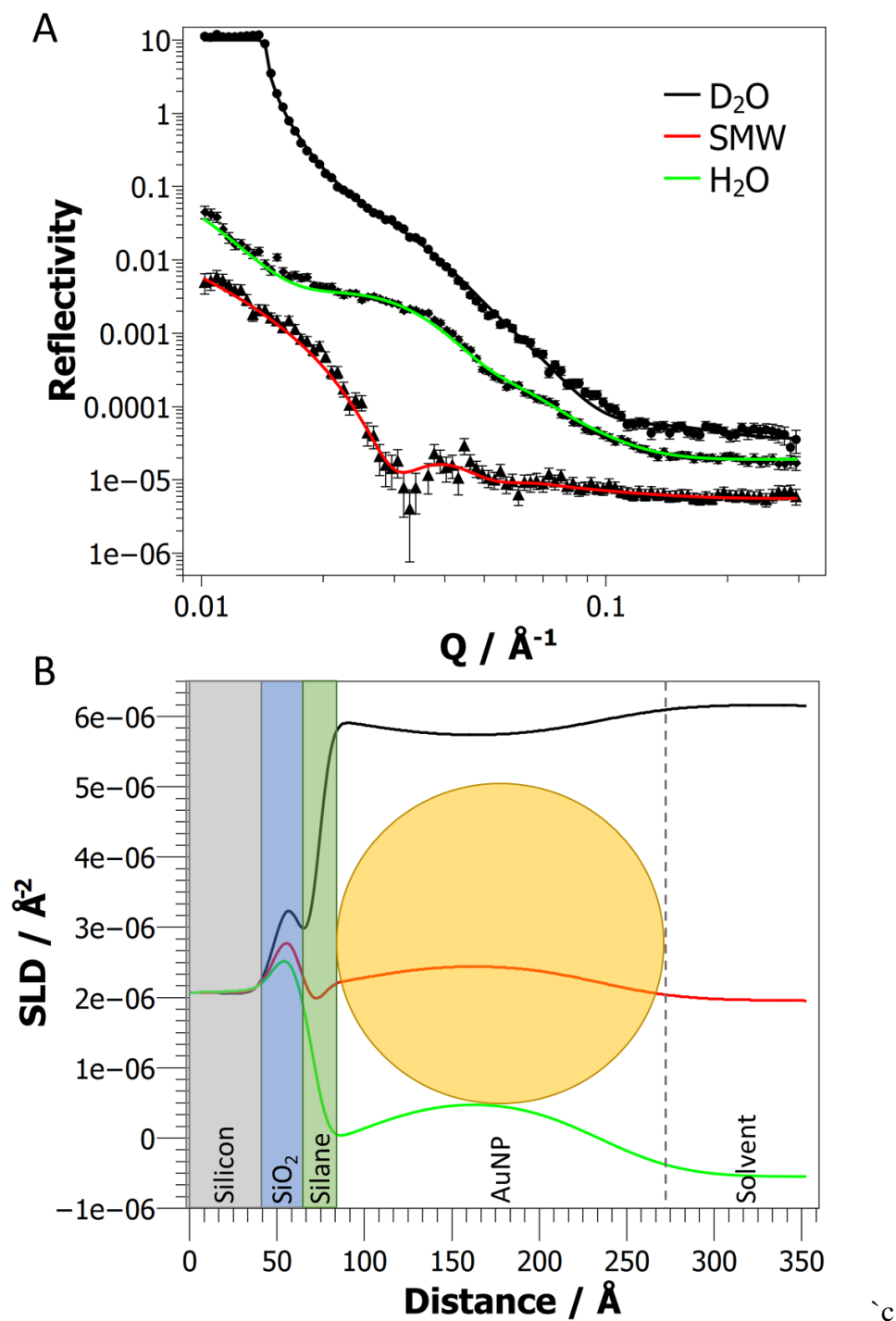


Figure S2 Data fitting and corresponding SLD profiles generated using the slab model for the AuNP coated surface. (A) Reflectivity data with the model fits represented as solid lines and the reflectivity profiles offset for clarity. The colours represent the different solvent contrasts, D_2O , **SMW** and **H_2O** . (B) The fitted SLD profiles show the change in the SLD as a function of distance away from the substrate surface, in the Z-Axis. A schematic representation of the surface is overlaid on the SLD profiles to highlight the different regions of the sample. Reflectivity data is available from DOI:10.5286/ISIS.E.RB1520380

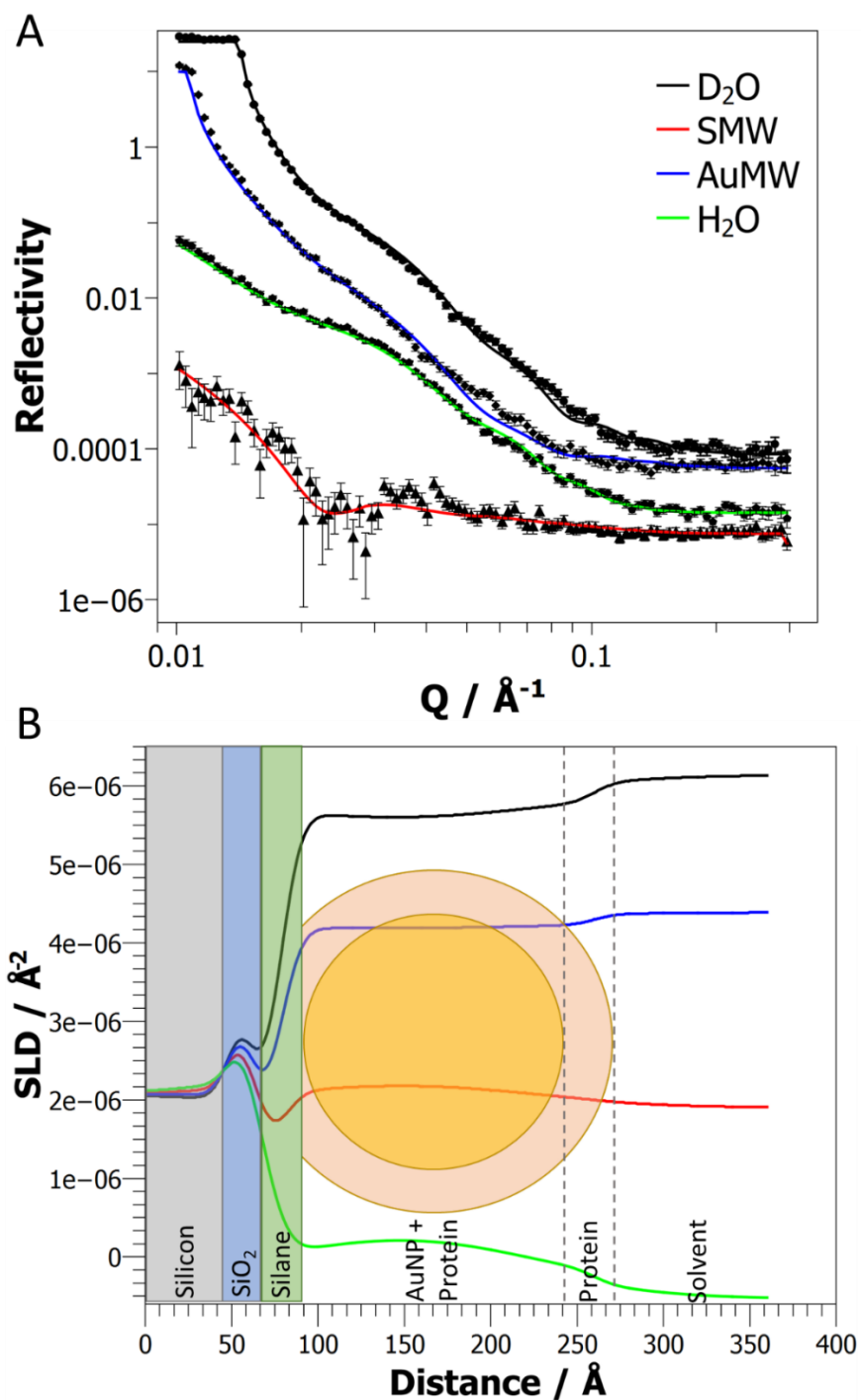


Figure S3 Data fitting and corresponding SLD profiles generated using the slab model for the AuNP coated surface after GGzOmpA_{TM} assembly. (A) Reflectivity data with the model fits represented as solid lines and reflectivity profiles offset for clarity. The colours represent the different solvent contrasts, D₂O, AuMW, SMW and H₂O. (B) A schematic representation of the surface is overlaid on the fitted SLD profiles to highlight the different regions of the sample. The orange layer around the nanoparticle represents the fitted protein and filler layer. Reflectivity data is available from DOI:10.5286/ISIS.E.RB1520380

Table S1 Model parameters fitted for the AuNP surface using the slab model.

| PARAMETER | FITTED VALUE |
|---|---------------------|
| SUBSTRATE ROUGHNESS / Å | 7.32 ± 1.35 |
| SIO₂ THICKNESS / Å | 15.04 ± 0.13 |
| SIO₂ ROUGHNESS / Å | 7.98 ± 0.15 |
| SIO₂ HYDRATION/ % | 17.47 ± 4.29 |
| SIO₂ SLD / Å⁻²×10⁻⁶ | 3.49 ± 0.06 |
| SILANE THICKNESS / Å | 8.57 ± 2.00 |
| SILANE ROUGHNESS / Å | 5.85 ± 2.05 |
| SILANE HYDRATION / % | 11.04 ± 22.01 |
| SILANE SLD / Å⁻²×10⁻⁶ | 1.00 ± 0.00 |
| GOLD LAYER THICKNESS/ Å | 179.17 ± 5.65 |
| GOLD ROUGHNESS / Å | 35.48 ± 10.62 |
| GOLD COVERAGE / % | 23.01 ± 6.18 |
| GOLD SLD / Å⁻²×10⁻⁶ | 4.18 ± 0.09 |

Table S2 Model parameters fitted for the GGzOmpA_{TM} coated surface using the slab model.

| PARAMETER | FITTED VALUE |
|---|---------------------|
| SUBSTRATE ROUGHNESS / Å | 7.93 ± 0.14 |
| SIO₂ THICKNESS / Å | 14.32 ± 1.27 |
| SIO₂ ROUGHNESS / Å | 10.50 ± 2.52 |
| SIO₂ HYDRATION/ % | 12.59 ± 9.42 |
| SIO₂ SLD / Å⁻²×10⁻⁶ | 3.48 ± 0.05 |
| SILANE THICKNESS / Å | 11.92 ± 4.73 |
| SILANE ROUGHNESS / Å | 10.00 ± 0.1 |
| SILANE HYDRATION / % | 0.09 ± 18.55 |
| SILANE SLD / Å⁻²×10⁻⁶ | 0.57 ± 0.18 |
| GOLD LAYER THICKNESS/ Å | 153.70 ± 14.25 |
| GOLD ROUGHNESS / Å | 65.51 ± 15.76 |
| GOLD COVERAGE / % | 23.71 ± 11.71 |
| GOLD SLD / Å⁻²×10⁻⁶ | 4.10 ± 0.00 |
| PROTEIN THICKNESS / Å | 30.33 ± 9.55 |
| PROTEIN ROUGHNESS / Å | 9.98 ± 0.05 |
| PROTEIN SLD / Å⁻²×10⁻⁶ | 1.49 ± 0.15 |
| PROTEIN HYDRATION / % | 90.10 ± 0.27 |

Table S3 Model parameters fitted for the AuNP and GGzOmpA_{TM} coated surfaces using the sphere model.

| PARAMETER | FITTED VALUE |
|---|---------------------|
| SUBSTRATE ROUGHNESS / Å | 7.69 ± 4.29 |
| SIO₂ THICKNESS / Å | 15.07 ± 0.15 |
| SIO₂ ROUGHNESS / Å | 14.44 ± 0.73 |
| SIO₂ HYDRATION/ % | 45.90 ± 7.03 |
| SILANE THICKNESS / Å | 8.00 ± 1.00 |
| SILANE ROUGHNESS / Å | 14.99 ± 0.01 |
| SILANE HYDRATION / % | 99.80 ± 74.36 |
| SILANE SLD / Å⁻²×10⁻⁶ | 0.97 ± 0.15 |
| GOLD LAYER THICKNESS/ Å | 183.68 ± 4.82 |
| AUNP COVERAGE (WITHOUT PROTEIN) / % | 38.90 ± 0.78 |
| AUNP COVERAGE (WITH PROTEIN) / % | 21.44 ± 1.78 |
| INNER COATING THICKNESS / Å | 22.93 ± 2.93 |
| INNER COATING HYDRATION / % | 0.05 ± 1.19 |
| INNER COATING SLD / Å⁻²×10⁻⁶ | 0.68 ± 0.19 |
| OUTER COATING THICKNESS / Å | 75.09 ± 0.17 |
| OUTER COATING HYDRATION / % | 84.40 ± 6.24 |