Confinement of Silver Triangles in Silver Nanoplates Templated by Duplex DNA

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Supporting Information

Materials and Methods

All the chemicals were of reagent grade used without further purification. High purity analytical grade silver nitrate (Ajax Chemicals) was used as silver precursor and L-ascorbic acid (Chem-Supply) was used as a reducing agent. Water with a resistivity greater than 18 MΩ.cm was acquired from a Millipure Milli-Q system. DNA-d(CGTAGATCTACG) was produced as described in Hunter, W. N.; Langlois d'Estaintot, B.; Kennard, O. *J. Mol. Biol.* **1988**, 202, 921. In a typical synthesis Ag^{+}-DNA complex was initially prepared, by dissolving AgNO3 (10 mM) in 0.003 wt% DNA solution in ultrapure Mili-Q water. The concentrations were carefully selected based on the earlier investigations using starch as a stabilizing agent. A separate stock solution of 10 mM L-ascorbic acid was prepared in water. A spinning disc reactor 100 series (Protensive, Inc) was used as a reaction vessel. The above solutions were delivered onto the disc surface using two feed jet within the SDP, at 0.5 ml/s, using continuous flow (MicroPump) gear pumps. Grooved stainless steel discs with 100 mm diameter were used. The disc surface was manufactured from 316 stainless steel. The 100 mm grooved disc used in the current study had 80 concentric engineered 0.6 mm grooves equally spaced. The product was collected and washed six times via centrifugation prior to

analysis. TEM imaging was performed using JEOL 2100 TEM at 120 kV and EDS was obtained on JEOL 3000F at 200 kV. TEM samples were prepared by placing a 0.5 ml droplet on a standard continuous carbon coated copper grid. The droplet was left to air dry.

Fluorescence analysis of sample droplets were performed using Olympus IX 72 inverted microscope. Four samples were prepared for comparison: DNA-Ag sample with EtBr; Silver nanoparticles without DNA treated with EtBr; Control EtBr sample without Ag and DNA; and DNA-Ag samples without EtBr. The samples were prepared by pipetting ~0.5ml of the solution and placing it dropwise onto pathology grade microscope glass slides. The droplets were imaged using conventional light and blue light, to observe any fluorescence.

Spinning Disc Processing

The key components of the SDP are: A rotating disc, the speed of rotation is controlled by a variable speed motor and two feed jets located at a radial distance of 0.05 m from the center of the disc to pump the reagent solutions. SDP generates a very thin fluid film (1 to 200 μm) on a rapidly rotating disc surface (300 to 3000 rpm), within which nano-particle formation occurs. As opposed to a batch reactor where a pool of reactants is mixed together all at once, a thin film is spread across a surface in one fine, thin layer. The thinness contributes to many influential chemical processing characteristics, one being a very high surface area to volume ratio, resulting in more favourable interactions between the film and its surroundings. Thin layering permits uniform heat transfer throughout the entire reaction mixture whereas the ability for such heat conduction and convection is absent in a batch reactor. In addition, strong shearing forces create

turbulence and break the surface tension of the film, making waves and ripples. These waves and ripples add to the vigor of mixing, enabling very high heat and mass transfer rates in the film. This in turn ensures extremely short reaction residence time enabling impulse heating and immediate subsequent cooling, along with plug flow identifying even mixing and transfer through the entire film. Consequently SDP offers the potential to manipulate and precisely control the nanoparticle formation under continuous flow, flash fabrication conditions.Details of the SDP design can be obtained from *www.protensive.co.uk.*

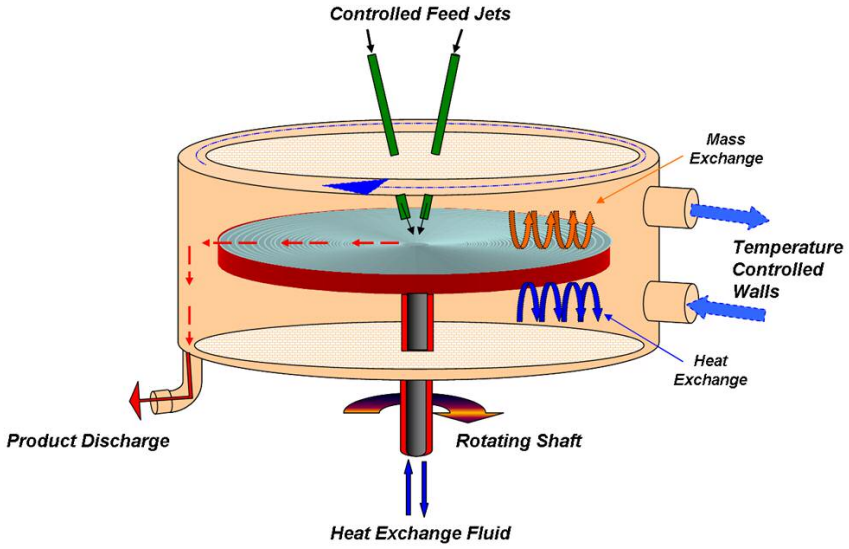

Fig. S1 Schematic of a Spinning Disc Processor (SDP).

S2: Fluorescence Analysis

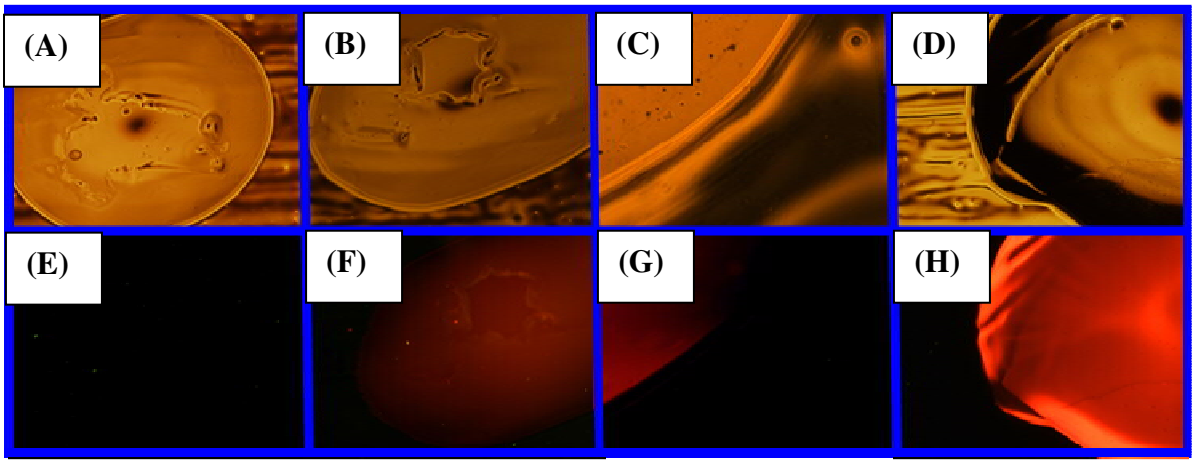

Fig. S3 Images of sample droplets taken under white light (A, B, C, D) and blue light(E, F,G, H). Sample description: (A, E): Silver-DNA; (B, F): EtBr; (C, G): Silver-Etbr (no DNA) and (D, H): Silver-DNA-EtBr.