Supporting Information

In-Situ Growth of Gold Nanoparticles on Latent Fingerprints – From Forensic Applications to Inkjet Printed Nanoparticle Patterns

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Experimental

Development of Latent Fingerprints: Sebum-rich (sebaceous) fingerprints were obtained from the volunteers by rubbing their fingers, washed with soap and ethanol, onto their foreheads and stamping them onto A4 paper or Whatman cellulose filter paper strips. The paper strips bearing the sebaceous prints were immersed in an aqueous solution of gold chloride ($HAuCl_4.3H_2O$, 1 mM) at room temperature. The fingerprints started to become visible after about one hour with the development of a red/purple colour, a characteristic colour of the gold nanoparticles (3-30 nm). After about 04 hours, the developed fingerprints were taken out, dried and stored at room temperature.

Screening of Sebacious/Eccrine Components for Gold Nanoparticles Formation/Assembly: A simple spot test (Fig. 2) was developed to screen various chemicals, common components of human sweat, to evaluate their potential for the formation of gold nanoparticles. 20 μL of 100 mM aqueous solutions/suspensions of individual or mixture of chemicals were spotted on a Whatman filter paper. After drying these spots at room temperature, the filter paper was immersed in 2 mM solution of gold chloride. The appearance of red/purple colour within 1-2 hours indicated the formation of gold nanoparticles. Using this simple test, we found lecithin as an important component of human sweat to form gold nanoparticles whereas KI further improved the rate of formation of gold nanoparticles at room temperature.

Synthesis of Aqueous Suspension of Gold Nanoparticles: An aqueous solution of $HAuCl_4$ (25 mL, 1 mM) was refluxed for 5-10 min, and a warm (50-60 °C) aqueous sospension of lecithin (6 mL, 10 mM) was added quickly. Reflux was continued for another 30 min until a red/purple solution was observed. Gold nanoparticles were also formed using lecithin at room temperature in the absence/presence of KI (1 mL, 20 mM). In either case, the particle solution was filtered through 0.45 μm Millipore syringe filters to remove any precipitants, and the filtrate was stored at room temperature.

Writing Lecithin Patterns and Developing with Gold: A mixture of lecithin (50 mM) and KI (5mM), the so called bio-ink, was filled in a common ball pen or the empty cartridges of inkjet printer (Epson Stylus D92). Invisible text/circuit patterns were written on an A4 paper using ball pen and/or inkjet printer and latter developed by soaking them in an aqueous solution of gold chloride (1mM) at room tepmerature. The patterns became visible (red/purple/blue colour) within 1-2 hrs due to *in-situ* growth of gold nanoparticles. Such patterns were also written in various fonts using inkjet printer and the development of smallest font text was also found possible.

Charaterization of Fingerprints/Patterns and Nanoparticles: Optical images of developed fingerprints and text/circuit patterns were taken using a digital camera (Sony, Cyber-shot DSC – H10). Gold nanoparticles produced on fingerprints were characterised using field emission scanning electron microscope (FESEM, JSM 7500F) at low voltage in gentle beam mode without any additional coating on paper. Suspended gold nanoparticles were characterized using transmission electron detector installed on JSM 7500 F. The specimens of suspended gold nanoparticles for inspection by transmission detector were prepared by slow evaporation of one drop of a dilute aqueous solution of the particles on a carbon coated copper mesh grid.

UV-visible scanning spectra of gold nanoparticles were recorded using a a Genesys 10-S spectrophotometer (Thermo Spectronic, USA).

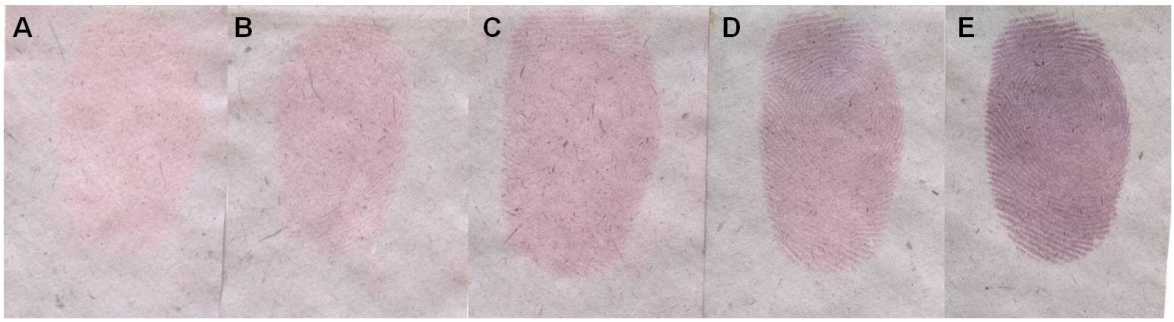

Figure S1. Optical images of latent fingerprints after development by *in-situ* growth of gold nanoparticles on ridge patterns on paper strips at different timings i.e., 30 min (A), 1 hr (B), 2 hrs (C), 3 hrs (D) and 4 hrs (E).

Figure S2. Optical image of latent fingerprints after development by *in-situ* growth of gold nanoparticles on ridge patterns on a plastic Petri dish.

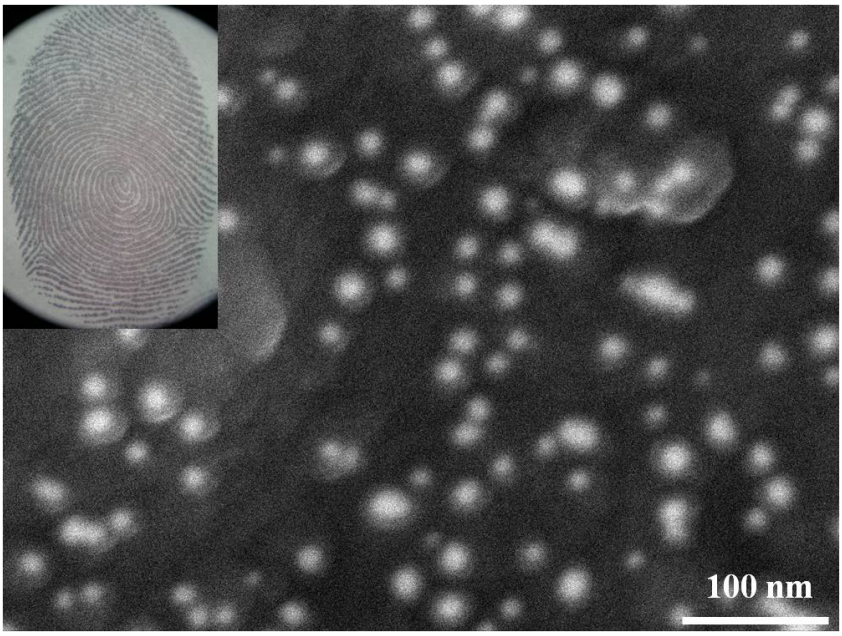

Figure 3S. Field emission scanning electron micrograph of gold nanoparticles generated on latent fingerprints. The inset shows the optical image of developed fingerprint imaged for this purpose.

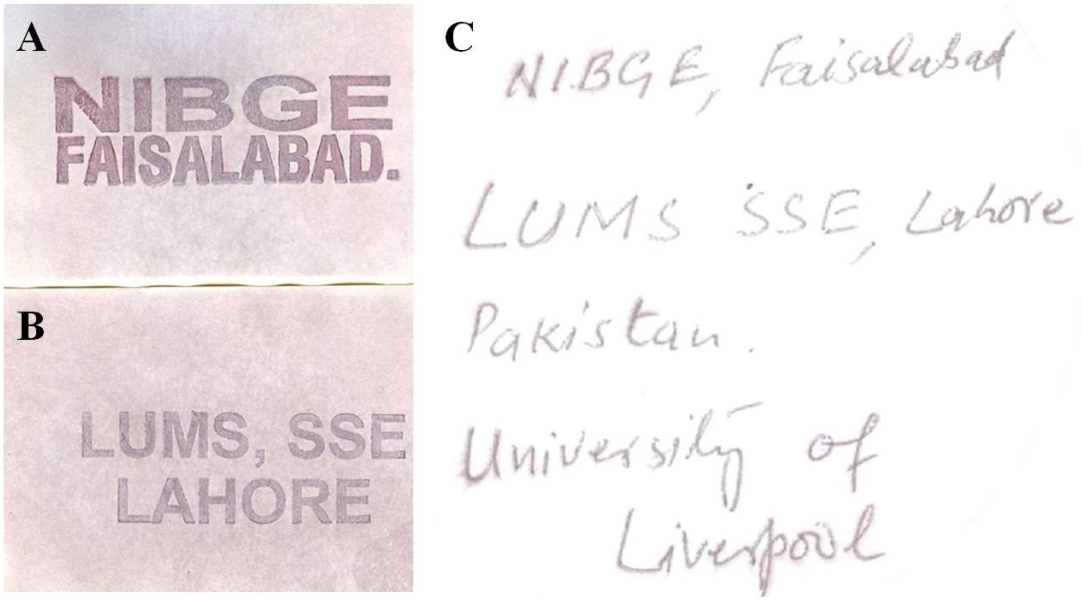

Figure 4S. Bio-ink (lecithin + KI) mediated in-situ growth of gold nanoparticles on stamped patterns (A & B) and on hand-written text using bio-ink filled common ball pen (C) on paper.