

Printing AuNP Using a Dimatix Printer

By Aishwarya Satish and Apurti Marodia

Advisors: Professor Tobias Hanrath & Professor Kathleen Vaeth

Cortisol detection in saliva is of great interest for the diagnosis of various disease states and the monitoring of stress in humans. Currently, measurements are performed predominantly by radioimmunoassay (RIA) which is expensive, labour intensive, uses hazardous radioisotopes and involves extensive delays in obtaining results. Detection of cortisol by competitive immunoassay using a secondary antibody eg. gold nanoparticles for signal enhancement is an attractive method, as it requires no chemical extraction or complex sample pre-treatment despite high saliva viscosity. This sensor system, when integrated into a lateral flow assay, provides an automated, analytical tool capable of yielding results in approximately 15 min. Good qualitative results depend on carefully controlled deposition of material on the assay conjugate pad. In this study, we investigate the utility of inkjet printing as a method for controlled metering of the gold nanoparticles during manufacture of the sensor strip, using a Dimatix Materials Printer (DMP) as the delivery system. Based on the experiments, it can be concluded that the ink formulated can be printed on fiberglass conjugate pad and a faint outline is noticable. When more of the concentrate obtained from centrifugation is added to the original solution, the more prominent the outline of the printed shape. This shows that there is potential to print the ink on the substrate, however a different printer is required. The Dimatix printer allowed very small quantities of ink to be printed at a time, and would therefore require days before the final product is complete. Thus a printer which can hold more ink and faster than the Dimatix would be necessary to print the layers faster.