## A.11: Probing of in-situ growth of gold nanoparticles at Energy Dispersive EXAFS beamline (BL-08) of Indus-2

The growth of block copolymer stabilized gold nanoparticles has been investigated simultaneously by recently setup in-situ time resolved EXAFS and UV-Vis absorption spectrophotometry at the Energy Dispersive EXAFS beamline (BL-08), Indus-2. Gold nanoparticles have been synthesized by mixing aqueous solution of Chloroauric acid with sodium citrate and pluronic block copolymer P85 as shown in Fig. A 11.1. The block copolymer acts as a reductant as well as a stabilizer. Sodium Citrate has been used as an additional reducing agent to get higher yield.

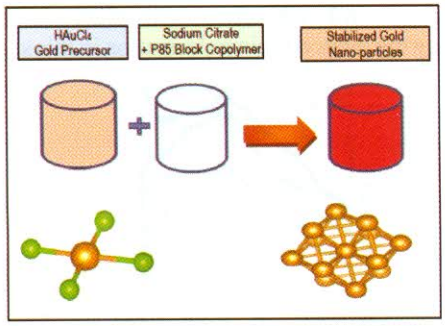


*Fig. A.11.1: Growth of block copolymer stabilized gold nanoparticles*

The in-situ setup of EXAFS Time Resolved EXAFS Facility at Indus-2 SRS's BL-08 beamline is shown in Fig. A.11.2.

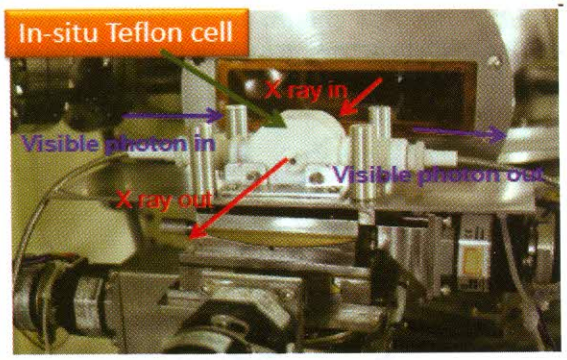


*Fig. A.11.2: The new Time Resolved EXAFS Facility at Indus-2 SRS's BL-08 beamline*

The EXAFS spectra have been measured for 90 minutes at an interval of 2 minutes and the radial distribution function shows the reduction of Au-Cl bond and the appearance of Au-Au bond with time which signifies the reduction of the gold precursor to gold nanoparticle, Fig. A.11.3.

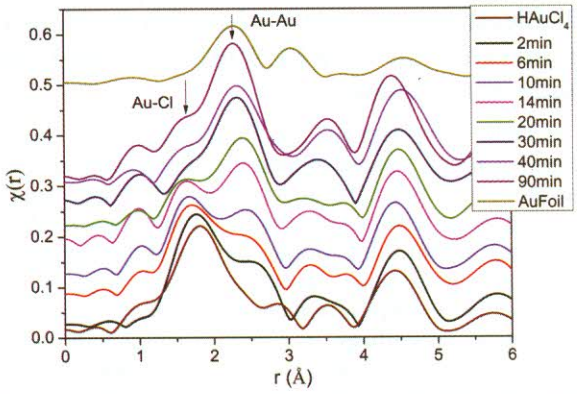


*Fig. A.11.3: Evolution of Au-Au bond from In-situ time resolved EXAFS Spectra*

From the spectra it is evident that after 10 minutes the growth proceeds very rapidly with a marked increase in the Au-Au peak and decrease in the Au-Cl peak. The above observation is also corroborated by the evolution of the surface plasmon peak of gold nanoparticles observed by in-situ time resolved UV-Vis spectrophotometry, Fig. A.11.4. The changes in colour of the reaction solution is shown in Fig A.11.5.

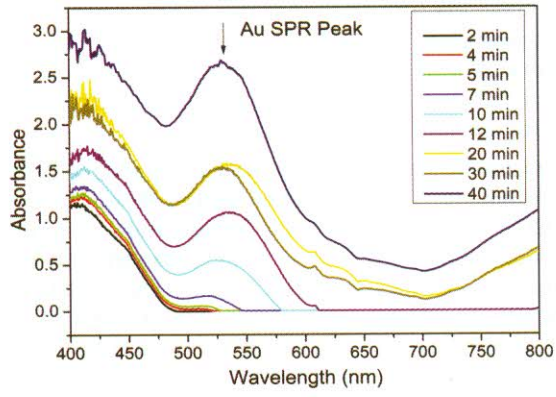


*Fig. A.11.4: Evolution of Au Surface Plasmon Peak from In situ time resolved UV-Vis Spectra*

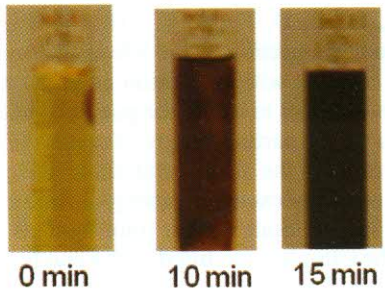


*Fig. A.11.5: Photographs during gold nanoparticle growth*

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