

## **Synthesis of Gold Nanoparticles Supported by Aggregated Assemblies of Triblock Copolymers in Aqueous Phase : Effect of Temperature**

POONAM BHANDARI<sup>1</sup>, POONAM SHARMA<sup>2</sup>, GURINDER KAUR<sup>3</sup>, MANDEEP SINGH BAKSHI<sup>1</sup>, and TARLOK SINGH BANIPAL<sup>2\*</sup>

*1Department of Chemistry, 2Department of Applied Chemistry, Guru Nanak Dev University, Amritsar-143 005, Punjab, India. 3College of North Atlantic, Labrador City, Canada A2V 2K7 NF*

**Abstract** — The effect of temperature on the self-assembled behavior of polymers P103 and P84, and their subsequent use as soft templates for the synthesis of gold (Au) nanoparticles (NP) have been studied with the help of SEM, TEM, and UV-vis spectral measurements. Both the triblock copolymers (TBP) exist in the form of liquid crystalline thread like assemblies. P103 being more hydrophobic shows a structural transition from liquid crystal (LC) threads to sheets at 50°C and bear uniformly distributed Au NP, the size of which increases with the increase in temperature. P84 being more hydrophilic shows only LC threads and no sheets, but the LC threads bearing running groove at 50°C, act as wonderful nucleation sites for the growth of large cubic Au NP. The presence of surface cavities constituted by polyethylene oxide (PEO) and polypropylene oxide (PPO) blocks on LC phase of both TBPs are considered to be the nucleation sites for Au NP. The greater hydrophobicity of P103 in comparison to P84 favors the uniform distribution of NP throughout the LC phase while an increase in the temperature facilitates this process.

**Keywords** : *Gold nanoparticles, triblock copolymers, liquid crystalline structures, temperature effect, hydrophobicity.*