

**INFLUENCE OF CHEMICAL REACTION CONDITIONS IN P(St-MMA-AA)
SYNTHESIS: VARIATION IN NANOPARTICLE SIZE, COLOR AND DEPOSITION
METHODS**

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Monodisperse latex nanospheres of P(St-MMA-AA) with different sizes were synthesized by soap free emulsion copolymerization and applied onto polyamide 6,6 fabrics.[1, 2] Two reaction parameters such as temperature (from 60°C to 90°C) and stirring (from 200 rpm to 400 rpm) were studied to obtain different sized nanospheres. Scanning Transmission Electron Microscope (STEM) and Scanning Electron Microscopy (SEM) were used to evaluate the nanospheres size and deposition structure. (Figure 1) The result showed two different nanosphere structural arrangements on the fabric surface, a hexagonal packed center (hpc) structure in the even surfaces ($\{111\}$ plane) and a square arrangement ($\{100\}$ plane), in the out-of-plane surfaces.[2,3] Two different deposition methods were used, gravitational sedimentation and dip-drawing.[4, 5] Different colors were observed, accordingly to particle size, violet (~170 nm), blue (~190 nm), green (~210 nm), yellow (~230 nm) and red (~250 nm). Iridescence effect (Figure 2), that is a typical characteristic of photonic crystals (PCs), was also observed on the samples displaying different colors at different observation angles.[6] Textile structural coloration may have the potential of reduce pollution in textile dyeing processes significantly reduce the water and chemical consumption.

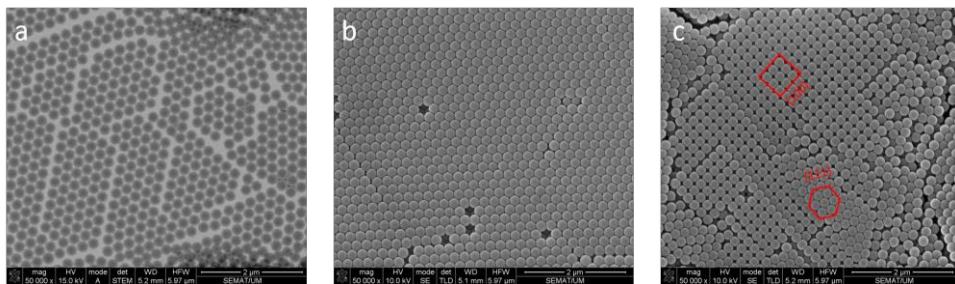


Figure 1 – Nanosphere evaluation size (215 nm) by STEM (a), SEM imaging of nanospheres deposition onto polyamide 6,6 fabric (b) and different nanoparticle arrangements observed (c).

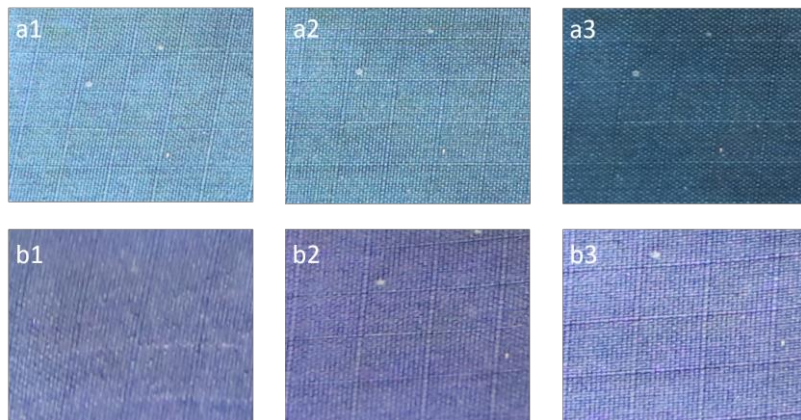


Figure 2 – Polyamide 6,6 fabric with 185 nm nanospheres at different observation angles, 45° (row a) and 90° (row b), with different angles of incidence of light, 70° (a1, b1), 45° (a2, b2) and 30° (a3, b3).

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