

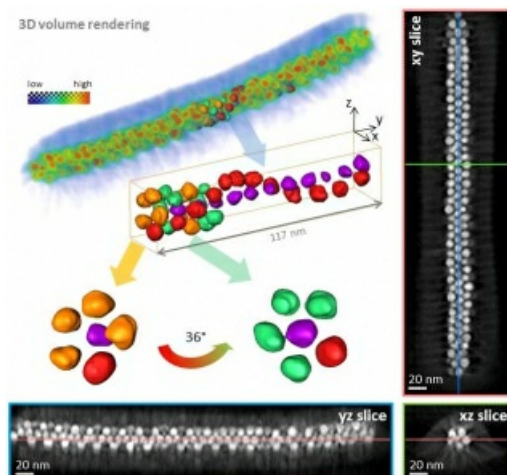
Nanostructures from self-assembled block copolymer/nanoparticle mixtures

Bhanu Nandan¹

¹Department of Textile Technology, Indian Institute of Technology Delhi, New Delhi, India
E-mail: nandan@textile.iitd.ac.in

Fabrication of core-shell hairy polymer nanostructures with well-defined shape has been a subject of immense interest in polymer chemistry for more than two decades now. Different approaches such as those involving synthesis (grafting approaches) and block copolymer self-assembly (solution as well as bulk) have been used for the preparation of such polymer brushes. Of these approaches that involving bulk self-assembled structures of block copolymers have been of special interest because of the simplicity and range of shape and structures possible. Here, we intend to demonstrate the fabrication of hairy polymer nanostructures via block copolymer self-assembly. The self-assembled cylindrical/spherical/layered domains formed by a cylinder forming block copolymer in bulk is isolated by selective swelling of the matrix in a solvent. The domains of well-defined shape so isolated have a hairy or brush-like shell and rigid core composed of matrix forming blocks. Furthermore, the different chemistry of the core and shell forming blocks could be utilized judiciously to impart targeted functionalities, such as metal nanoparticles, either in the core or shell of such cylindrical brushes. This could further be extended to the case where two different functionalities loaded in core and shell is combined in the same shaped nano-object leading to nanomaterial with multifunctional properties. Additionally, it will be demonstrated that the block copolymer mixed with nanoparticle may exhibit hierarchical self-assembly such that nanostructures with organized nanoparticles could also be isolated.

- [1] Pal, J.; Sanwaria, S.; Srivastava, R.; Nandan, B.; Horechyy, A.; Stamm, M. (2012). *J. Mater. Chem.* 22, 25102-25107
 [2] Sanwaria, S.; Pal, J.; Srivastava, R.; Formanek, P.; Stamm, M.; Horechyy, A.; Nandan, B. (2013). *RSC Adv.* 3, 24009–24012
 [3] Sanwaria, S.; Horechyy, A.; Wolf, D.; Chu, C.-Y.; Chen, H.-L.; Formanek, P.; Stamm, M.; Srivastava, R.; Nandan, B. (2014) *Angew. Chemie. Int. Ed.* 53, 9090–9093.



Keywords: [block copolymer](#), [nanoparticle](#), [nanostructure](#)