

Conductive surface-grafted polymer brushes

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Surface grafted polymer brushes refer to an assembly of macromolecules attached with one end to a surface and stretched away from it. The stretched conformation of the tethered chains and their conformational freedom leads to unique properties of the brushes and specific applications. Conductive polymer brushes grafted from surfaces, as examples of such structures, are very desirable for e.g. organic photovoltaics and molecular electronics since they would form directional nanoscale pathway for charge transport. However, synthesis of surface-grafted conjugated polymer brushes is still very challenging since there are no controlled polymerization techniques easily applicable for that purpose.

We have only recently introduced self-templating surface-initiated polymerization (ST-SIP) leading to synthesis of ladder-like brushes with one chain in a pair being conjugated.[1] Iniferter-based photopolymerization was applied to obtain the macromonomer brushes grafted from gold surface and containing acetylene side groups. The prealigned groups were subsequently reacted forming conjugated chains. Such obtained brushes after doping exhibited high conductivity in the direction perpendicular to the surface as showed using conductive atomic force microscopy. The general route was later used for synthesis of polyelectrolyte conjugated brushes [2] and may be easily applied for obtaining other polymer architectures comprising conjugated polymers (mixed brushes, block conductive-nonconductive brushes etc.).

[1] M. Szuwarzyński, J. Kowal, S. Zapotoczny, *J. Mat. Chem.* 2012, 22, 20179.

[2] K. Wolski, M. Szuwarzyński, S. Zapotoczny, *Chem. Sci.* 2015, *in press*.