Thermoresponsive Block Copolymer Grafted on Core-Shell Nanoparticles

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Since 1966, when the poly(2-oxazolines) (POx) were discovered, they have undoubtedly been recognized as a polymer class with high synthetic versatility and good biocompatibility, giving access to highly functional and adaptable materials.[1] The poly(2-oxazolines) are prepared through cationic ring-opening polymerization (CROP), which allows for a simple control of the reaction condition, mainly due to the absence of undesired termination, and even possible chain transfers are suppressed. Furthermore, the large available number of monomers with different side chain modifications opens the path towards the fabrication of innovative smart materials having a manifold of applications.[2,3]
Taking into account such observations, we envisage the possibility of designing and synthesizing a block-copolymer featured by: (i) a polar side chain able to trap organic and/or inorganic compounds (*e.g.* heavy metal in wastewater or active principles for drug delivery applications); (ii) a thermoresponsive scaffold able to change the interaction with the media by tuning the temperature. Subsequently, we intend to graft these polymers onto iron oxide nanoparticles (high grafting density) or on organic cores. Herein we report our results involving the synthesis of the two Fragments (A and B) and the consequent grafting system to the nanoparticles. Finally, we present the test for heavy metal binding in combination with the thermoresponsive behavior of our products.

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