

Development of supramolecular polymers and hydrogels for nanomedicine and sustainability applications

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Supramolecular self-assembly driven by host-guest interactions offers a versatile and powerful approach for constructing novel polymeric architectures from tunable functional macromolecular building blocks. Over the past two decades, our research group has focused on creating novel self-assembled polymeric micro- and nanostructures starting from both biobased and synthetic polymers. These polymer blocks have been engineered to form functional hydrogels, micelles, micro- and nanoparticles, nanovesicles, and surface coatings. The developed supramolecular polymers, hydrogels and nanoarchitectures have been applied for drug/gene delivery systems, tissue engineering, and bioimaging and diagnosis, as well as for artificial soil and solar-driven water harvesting for sustainable agriculture, and as superabsorbent materials for wastewater treatment, removal of environmental pollutants, and resource recovery.