Bicontinuous nanophasic amphiphilic conetworks as intelligent drug release matrices and nanoreactors for novel nanohybrids

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Undoubtedly, multicomponent polymer architectures have gained significant interest over the years due to their special properties and to the large variety of application possibilities. Among such macromolecular materials, polymer conetworks, especially amphiphilic conetworks (APCNs), composed of chemically (covalently) bonded hydrophilic and hydrophobic polymer chains, belong to a special class of rapidly emerging nanostructured materials with various unique structural features and characteristics (see e.g. Refs. 1-7 and references therein). Because of the immiscibility of the components, the synthesis of such macromolecular assemblies is quite challenging. Several successful synthetic routes have recently been developed by us, including various protection-deprotection schemes. Unique bicontinuous (cocontinuous) nanophase separated morphology exists in APCNs in a broad composition window with domain sizes in the range of ~2-30 nm. This provides unprecedented possibilities to obtain various new specialty intelligent (smart, responsive) and organic solvent selective superabsorbent poly(ionic liquid) conetwork gels, and catalytically active organic-inorganic nanohybrids by applying one of the nanophases as nanoreactor. The resulting novel materials have a variety of high value-added potential applications from intelligent drug delivery to antibacterial biomaterials, nanocatalysis, photonics, energy and environment protection related materials, sensors, and specialty superabsorbents etc.

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