Sol-gel intelligence: An approach towards injectable systems derived from nature inspired biopolymers

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Since a number of biopolymer solutions usually undergo temperature and pH triggered gelation at extreme conditions (such as strong alkaline pH for chitosan, strong acidic pH for pectin and high temperature for albumin), our sol-gel intelligence polymers have been developed to offer the predetermined sol-gel phase transitions of such biomolecules. Thus, injectable hydrogels with the tunable gel point can be achieved. For instance, a sol-gel intelligence based on methoxy-poly(ethylene oxide) and ε-caprolactone diblock copolymer, when conjugated to chitosan (POCSAN gel), facilitated the gelation of chitosan solution at physiological temperature and mild-acidic pH environments where acidic tumors can be targeted. POCSAN gel also demonstrated good sustainability for delivery of both hydrophilic and hydrophobic drugs at the physiological temperature and pH of acidic tumor microenvironments. Another example was a sol-gel intelligent system derived from poly(amino urethane) conjugated bovine serum albumin (PABSA gel). PABSA solution demonstrated its sol-gel phase transition at physiological condition (37°c and pH = 7.4), which was well below the gelation temperature of native albumin. This PABSA gel showed the sustained release of encapsulated lysozyme over 2 weeks *in vivo*.

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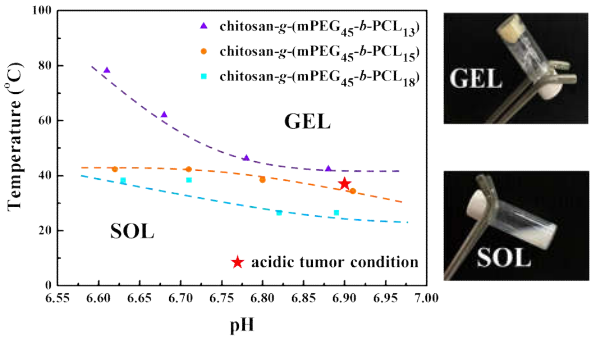

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