Tuning Capsules from Metal Phenolic Networks for Biomedical Applications

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The assembly of metal phenolic networks (MPNs) is a versatile procedure to coat substrates with different surface properties in a single step. This has led to the development of a number of thin films and capsules [1]. The formation of an MPN film is based on coordination interactions between metals and phenolic ligands. This chemistry has proven to be successful for a number of metals (e.g., Fe^{III}, Zr^{IV}, V^{III}) and ligands, ranging from the large polyphenol tannic acid (TA) to the small molecule gallic acid (GA) which is the simplest subunit of TA [2,3]. The coordination bonding within the network is pH-dependent and MPN films can be disassembled in acidic pH, which is an attractive release trigger for cancer drug delivery systems [4]. The formation of MPNs from diagnostically relevant metals such as Gd^{III} for magnetic resonance imaging (MRI) or $^{64}Cu^{II}$ for positron emission tomography (PET) further highlights the potential of these systems for biomedical applications [2].
Current research focuses on engineering MPNs from functional phenolic ligands and investigates advanced trigger mechanisms for stimuli-responsive disassembly to improve these systems in drug delivery applications.

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