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Natural Polyphenols as Versatile Platforms for Material Engineering and Surface Functionalization

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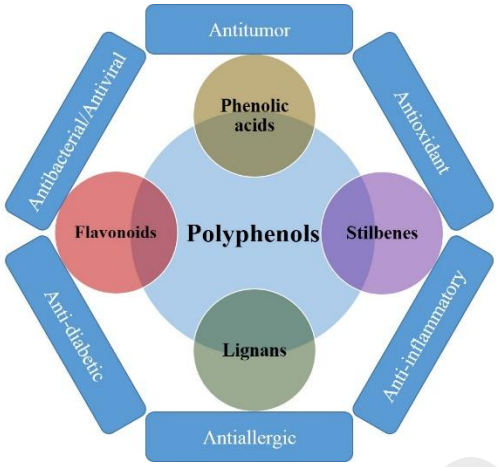
Graphical abstract



Abstract

Polyphenols, the ubiquitous secondary metabolites of plants, are an important part of human diet and are essential for plant functions. They have attracted considerable interest due to their important biological activities as well as intriguing chemical and physical properties. Polyphenols allow a whole panoply of chemical and physical interactions with interesting molecules and surfaces to be established. Thus, polyphenols can serve as versatile building blocks for the preparation of various functional materials, such as capsules, antibacterial and antioxidant films, micro/nanoparticles, membranes, electronic and energy storage materials, hydrogels, and cell encapsulants, with fascinating structures and properties. In addition to their important roles in engineering of functional materials, they also emerge as pivotal components in the construction of versatile surfaces, including antifouling, antibacterial, antioxidant, cell adherent and proliferable, enzyme-immobilized, patternable and peptide-