

Poly(dopamine), the First Material-Independent Surface Chemistry

Haeshin Lee

Department of Chemistry
KAIST, Korea
Center for Nature-inspired Technology (CNiT)
E-mail: *haeshin@kaist.ac.kr*



Polydopamine is the first material-independent surface chemistry reported in 2007 (Haeshin Lee et al. *Science* 2007, 318, 426). In addition to the capability in the universal surface modifications, it provides a variety of unique functions to surfaces. First, it shows unparalleled potentials for inter-molecular interactions including covalent, coordination, electrostatic, hydrogen-, pi-pi, and pi-cation bonds which enable the polydopamine coating layer to immobilize virtually all ions, small and macromolecules. Second, it shows redox power for which the electrons released from a polydopamine layer reduce noble metal ions such as gold, silver, and platinum. Third, it opens possibilities for other catecholamine polymers to perform similarly with polydopamine, but providing novel functions to surfaces that polydopamine itself is not able to show. The corresponding catecholamines are poly(norepinephrine) and poly(3,4-dihydroxyphenylalanine, DOPA) coatings. Discovery of polydopamine is a good example of the important influence of nature-inspired science because the motivation to invent polydopamine is the amino acid compositions of the adhesive proteins identified in marine mussels.