

Colloquium

Thema: ***Selective self assembly of neurotransmitter molecules on polyelectrolyte multilayers***

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The self assembly of organic molecules on metal/oxide layers, with a well-defined supramolecular structure, has progressed rapidly in recent years and found applications at the forefront of science and technology like nanoelectronics and biomaterials. Polyelectrolyte multilayers (PEMs) has also attracted extensive attention as a highly useful way in assembling a number of organic and inorganic architecture assemblies. However, direct interactions between neurotransmitter molecules and PEMs are sufficiently unexplored. In this work, we compare the adsorption behavior of polarized neurotransmitter biomolecule, glutamic acid, on terminal poly(allylamine)hydrochloride (PAH) polyelectrolyte and a terminal poly(styrenesulfonate) (PSS) polyelectrolyte multilayer. Using small angle X-ray and neutron scattering experiments, the internal structure of such a supramolecular film has been revealed with high resolution at a single monolayer level and the volume fraction of the adsorbed glutamic acid is determined. It has been shown that the glutamic acid binds only to the terminal PAH layer as a distinct monolayer. Multiple Attenuated total reflection infrared (ATR-FTIR) spectroscopy confirms that glutamic acid is electrostatically physisorbed on PAH surface in the zwitterionic form. On the other hand, terminal PSS multilayers show resistance towards glutamic acid. Such repulsion and adsorption between the neurotransmitter and polyelectrolytes could be potentially used in a variety of medicinal applications.

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