Molecular self-assembly towards macroscale ordering: application as SERS substrate

Hidehiko Asanuma,[1] Helmuth Möhwald[1] and Takashi Nakanishi[2]

[1]*Department of Interfaces, Max Planck Institute of Colloids and Interfaces, 14476 Potsdam, Germany*
[2]*Macromolecules Group, National Institute for Materials Science, Organic Nanomaterials Center, Tsukuba 305-0047, Japan*

Hidehiko.Asanuma@mpikg.mpg.de

A "bottom-up" approach to construct organized structure has been investigated immensely by scientists and engineers. Self-assembly has shown to fabricate numbers of different organized structures. Molecular self-assembly, however, has yet to exhibit ordered structure greater than micron; at greater scale, molecular interactions alone rarely translate into organized structure. Here, we report a method where intermolecular forces among the molecules solely drive structural formation of highly organized three-dimensional structure at macroscopic scale. The method involves spreading solvated molecule at air-water interface. By tuning equilibrium and non-equilibrium conditions, intermolecular forces among the molecules solely can drive structural formation to organize at meso/microscopic scale. Currently, the library of molecules that are capable to form such structures are expanding. Furthermore, these mesoscopic structures were metalized and applied as a surface enhanced raman spectroscopy (SERS) substrate, Terahertz (THz) antenna, and for surface enhanced photochemistry.