Abstract

Learning from nature and based on lotus leaves and fish scale, we developed super-wettability system: superhydrophobic, superoleophobic, superhydrophilic, superoleophilic surfaces in air and superoleophobic, superareophobic, superoleophilic, superareophilic surfaces under water. Further, we fabricated artificial materials with smart switchable super-wettability. The concept was extended into 1D system. Energy conversion systems that based on artificial ion channels have been fabricated. Also, we discovered the spider silk’s and cactus’s amazing water collection and transportation capability, and based on these nature systems, artificial water collection fibers and oil/water separation system have been designed successfully. We also extended the superwettability system to interfacial chemistry, including basic chemical reactions, crystallization, and nanofabrication arrays.