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Smart regulation of surface adhesion for multifunctional applications

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Adhesion between solid and liquid can be seen everywhere in our human life, agriculture and industry, such as oil-water separation, lab on the chip, high efficiency heat exchanger, water collection; although great progress has been achieved in this field. There are still some unsolved problems. The first one is unstable adhesive properties mainly caused by the structural damage during the use. That is the surface structure is unstable during the use. To solve this issue, we introduced nanoscale layered structures and heterostructures into surface microstructure to improve anti-adhesive stability and mechanical stability and then extend the life of the material. The second one is difficult to achieve *in situ* reversible adhesion regulation between surface and liquid because most of the interface response is slow response. For this issue, we had obtained fast reversible regulation of the adhesion between surface and liquid by applying an electric field, photoelectric synergistic stimulation and temperature. Then we use them in smart driven of the liquid motion.

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