Advancing Materials and Batteries by Micro-Adhesion Guided Technologies

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Abstract

Materials and device processing often takes material flow and deformation as its scientific foundation, the evolution and precise regulation of multiscale morphological structures under multi-field coupling as the backbone of research, and the material products with customized properties and functions as its final goals. It can be seen that our ability to control the flow and deformation process of materials determines the level of material processing technologies. Here, we tried to design and take the advantages of microadhesion/absorption between solid micro-/nanomaterials and various liquids to regulate the flow, deformation and aggregation behavior of the components, so as to realize the customization of the structure and properties of materials at different scales. Under the guidance of this idea, our research group has developed a variety of functional materials and their processing technologies, including micro-adhesion guided "nano-storm" processing technology of core-shell active particles, micro-adhesion guided fabrication of biomimetic binders and polymer electrolytes, micro-adhesion guided instant spinning technology, and micro-adhesion guided electrode microenvironment optimization, etc. The above research results preliminarily demonstrate the promising applications micro-adhesion guided technologies in advanced battery materials, functional micro-/nanomaterials, and micro-/nano-processing of polymer materials and so on.