Polymer Nanomaterials Using Porous Templates

Jiun-Tai Chen

Department of Applied Chemistry, National Yang Ming Chiao Tung University, Hsinchu, Taiwan

Center for Emergent Functional Matter Science, National Yang Ming Chiao Tung University, Hsinchu, Taiwan

jtchen@nycu.edu.tw

Template wetting methods have been widely applied in the preparation of one-dimensional (1D) polymer nanomaterials. We study the fabrication and characterization of different polymer-related nanomaterials by wetting porous templates. The templates we choose are anodic aluminum oxide (AAO) templates because of the regular pore distribution, high pore density, and high aspect ratio of the pores. We report novel smart nano membranes (SNM) that are made up of anodic aluminum oxide (AAO) templates grafted with spiropyran molecules. The ultraviolet and visible light responses of the SNM under acid vapors are investigated. Under UV irradiation, the ring-closed spiropyran on the AAO templates transform to ring-opened merocyanine, which contains phenolate oxygen and can be further protonated by acids. We also present a facile light-induced nanowetting (LIN) method to fabricate patterned nanoarrays. Photoresponsive azobenzene-containing polymers (azopolymers) that exhibit light-induced reversible solid-to-liquid transitions are used. Notably, using designed photomasks, the patterns of the nanoarrays can be ingeniously controlled with the characteristic of erasable and rewritable nanostructures.

Professor, Jiun-Tai Chen
Department of Applied Chemistry, National Yang Ming Chiao Tung University, Hsinchu 30010, Taiwan
E-mail: jtchen@nycu.edu.tw

Education/Career:

2021-now Distinguished Professor, Applied Chemistry, National Yang Ming Chiao Tung University
2016-2021 Professor, Applied Chemistry, National Chiao Tung University
2013-2016 Associate Professor, Applied Chemistry, National Chiao Tung University
2010-2013 Assistant Professor, Applied Chemistry, National Chiao Tung University
2008-2010 Postdoctoral Fellow, Chemistry, The University of Texas at Austin
2003-2008 Ph.D., Polymer Science and Engineering, University of Massachusetts, Amherst

Research Interests

Polymer nanomaterials, stimuli-responsive materials, wearable devices