

Abstract Submitted
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Tunable TiO₂ Nanotubes as Nanotemplate for Solar Cells¹ JIA LU, DONGDONG LI, USC, NAMI TEAM — Titanium oxide (TiO₂) is an n-type semiconductor with a bandgap energy of 3.0-3.2 eV. It has broad applications, because of the versatile functionalities. Synthesis of anodic titanium oxide (ATO) nanotube templates has gained significant progress in fluoride-ion-contained electrolytes. The one-dimensional (1D) structure provides a large specific surface area as well as a direct pathway for charge transport, thus rendering superior capabilities in lightharvesting, electrochromic switching, environmental sensing, energy storage, etc. In this work, highly ordered ATO nanotubes film has been synthesized by two-step anodization method. After using a reductive doping approach, the metal materials (Cu and Ni) can be electrodeposited into the nanotubes. The versatile process yields reproducible tubular structures in ATO nanotubes due to the conductive nature of crystallized TiO₂, indicating great potential for nanotemplate application. A dye-sensitized solar cell is also demonstrated by employing the ATO films. It is observed that bottom treatment greatly enhances short current density and filling factor resulting in improved energy conversion efficiency.

¹DOE EFRC

Jia Lu
USC

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