

Abstract Submitted  
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**Highly Efficient Dye Sensitized Solar Cells based on Free-  
Standing Titania Nanotube**<sup>1</sup> CHAEHYUN KIM, SUNGJIN KIM, ALEXAN-  
DER CARTWRIGHT, HAO ZENG, SUNY at Buffalo — Dye sensitized solar cells  
(DSSC) attract great attention due to their respectable efficiency with very low  
fabrication cost, good performance under diffuse light conditions and ability to be  
fabricated on flexible substrates. Its main efficiency limiting factor is the random  
hopping of electrons within the titania nanoparticle network, which causes carrier  
trapping and recombination. The charge transport and collection can be enhanced  
by employing ordered nanostructures such as nanowire or nanotube arrays. How-  
ever, nanowire/nanotube based DSSCs with efficiencies higher than those of conven-  
tional DSSCs have yet to be demonstrated. In this work, we report the fabrication  
of DSSCs using highly crystalline free-standing titania nanotube arrays. The high  
crystallinity leads to high electron mobility and diffusion length, allowing thick nan-  
otube films to be used for improving the long wavelength light absorption. This  
greatly enhances the photocurrent and power conversion efficiency as compared to  
that of nanotube DSSCs in earlier studies.

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