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Dye Sensitized Solar Cells Based on Free-standing TiO2 Nanotube[1] CHAEHYUN KIM, SAVAS DELIKANLI, SAMANTHE PERERA, HAO ZENG, Uniersity at Buffalo, SUNY — Dye-sensitized solar cells based on free-standing TiO2 nanotube arrays as electrodes have been fabricated. It was shown that highly ordered vertically oriented TiO2 nanotube arrays offer a large surface area for adsorption of dye molecules or quantum dots and provide a direct pathway for fast electron transport. This cuts down carrier recombination and enhances photoconversion efficiency. TiO2 nanotube arrays were obtained by potentiostatic anodization of titanium foil in fluoride-based ehylene glycol electrolyte. TiO2 nanotube arrays can be detached from the titanium foil by chemical etching and annealed at high temperatures to obtain highly crystalline anatase phase without cracking, since there is no strain induced between TiO2 and Ti foil. Solar cells based on free-standing dye-sensitized solar cells reveal much higher overall efficiency than those with nanotubes attached to the Ti foil, due to the improved crystallinity and front side illumination. J. Phys. Chem. C 2009, 113, 6310–6314

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