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TIO2 NANOSTRUCTURES AND APPLICATION TO DSSC ANd ECD

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TiO2 nanoparticles were controlled to 7~30 nm by a solvothermal synthetic method. Also, the TiO2 nanotubes were prepared by reflux of titania in a concentrated NaOH, and the mesoporous films were fabricated by evaporation-induced self-assembly (EISA) process. These TiO2 nanostructures were applied as electrode materials for dye-sensitized solar cell (DSSC) and/or electrochromic device (ECD). First, the DSSC derived from smaller-sized TiO2 showed relatively higher Jsc in overall, since they have larger surface area to adsorb more N3 dye molecules. The Jsc of DSSC from 7 nm-sized TiO2 was slightly lower than that of DSSC from 15 nm-sized particles, even though the adsorbed amount of dye was as high as 1.3 times. This suggests that the pore structure of TiO2electrode is an important factor in determining Jsc, because it influence on the ionic diffusion of electrolytes. Second, the phosphonated viologen was anchored on the surfaces TiO2nanostructures for the construction of a typical ECD. The effect of particle size and pore structurehas been investigated with regard to the switching time and contrast ratio for the fabricated ECD. The ECD derived from 7 nm-sized TiO2 demonstrated the highest contrast ratio with high optical transparency, whereas it showed the slowest switching response. We have also found that the mesoporous TiO2 films can also be a possible candidate for the cathode material of ECD.