

A facile screening method of photocatalytic activity of highly crystallized mesoporous titania using silicon resonators

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We synthesized a mesoporous titania film using the combined assembly of soft and hard method and compared its photocatalytic activity with those of other titania films fabricated from nanoparticles or via a sol-gel reaction. Titania films were coated on a microcantilever array which is used to investigate the photocatalytic activity. The photocatalytic decomposition of methylene blue under UV irradiation was monitored by measuring changes in the resonance frequency of each cantilever. The mesoporous titania film showed higher photocatalytic activity than conventional titania films fabricated from nanoparticles or via a sol-gel reaction; this difference is attributed to the purely anatase crystalline morphology as well as its well-organized pore structure. Since the microcantilever measures absolute mass changes with unprecedented sensitivity, it provides more direct information on the photocatalytic degradation of organic molecules than conventional methods such as GC and UV-vis. The arrayed structure of the cantilever enables measurement of multiple samples simultaneously, resulting in a highly efficient tool for the screening of photocatalyst candidates.