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Improvement of photocatalytic activity of TiO₂ thin film combining by sol-gel coating and RF plasma treatment methods

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We have deposited titanium dioxide (TiO₂) thin films on glass using a single molecular precursor such as titanium (IV) iso-propoxide (Ti[OCH(CH₃)₂]₄, 97%) by sol-gel processing. In order to elevate photocatalytic activity of the as-grown TiO₂ films, oxygen plasma ignited by radio-frequency (RF) under vacuum condition was also used in the range of 50 - 200 W within 0.5 hr at room temperature. During toluene and phenol removal test, photocatalytic activity was evaluated by the measurements of the UV/vis. irradiation, refractive index, contact angle, XPS, and AFM analysis. In this work, the effect of the plasma on the improvement of hydrophilic property of photocatalytic has mainly been investigated. A superhydrophilic property and smooth surface morphology appeared in the UV light irradiation with O₂ plasma treatment. Based on this work, we confirmed that the oxygen RF plasma treatment method was very reliable method for the synthesis of TiO₂ thin films with high catalytic performance.