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Photocatalytic activity of N-doped TiO₂ produced by sol-gel method and anodizing method in degradation of RO-16

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In this work we introduce Plasma nitriding as an effective method to enhance the photocatalytic activity of the TiO₂. TiO₂ synthesis was done by the sol-gel and anodizing methods separately. The plasma nitriding of TiO₂ was carried out at temperatures ranging from 400°C to 600°C with different N₂-H₂ gas mixtures and treatment times. In order to investigate N-doped TiO₂ characterization, some tests such as XRD, UV-Vis spectroscopy, SPM, XPS, SEM, and EDX were used. EDX and XPS results prove nitrogen penetration into TiO₂ structure. The sample prepared by the sol-gel method on a glass substrate has lower activity than non-doped one after nitriding due to silicon penetration and agglomeration phenomena. The N-doped TiO₂ nano tubes showed better photocatalytic activity in degradation of RO-16. The nitridation treatment leads to significant effects on visible photoresponse and also the photocatalytic activity of anodized films. In addition, the sample which was nitrided in 450°C and then anodized has the most efficiency between other samples according to photocatalytic degradation test.

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