

## **XPS and VUV studies of N-doped TiO<sub>2</sub> Sol-Gel Films**

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Information about the structural environment of nitrogen anions in TiO<sub>2</sub> host matrices is necessary in order to tailor a glass composition with optimized spectral properties for photocatalytic applications.

The present study is aimed at determining the influence of the N ions on the structural glass environment around Ti cations in amorphous TiO<sub>2</sub> matrices (oxynitride films). For this purpose, thin film samples of TiO<sub>2-x</sub>N<sub>x</sub> compositions, with N concentrations up to  $x = 0,75$  (25 at.%), were prepared by sol-gel processing followed by spin-coating onto Si(100) wafers, glass slides and CaF<sub>2</sub> substrates. The samples were then studied by X-ray photoemission spectroscopy (XPS) and Vacuum ultraviolet (VUV) light scattering, after being annealed up to 500°C. These measurements allowed the determination of the concentrations of the different Ti-O-Ti, N-Ti-O and Ti-N-Ti bonding sequences. XPS data were correlated to thermal behavior and optical properties. Photoabsorption spectra of oxynitride thin films are reported in the energy range 3.9–10.8 eV (320–115 nm). Electronic state assignments have been suggested for each of the observed absorption bands.