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Preparation of Ti-Fe precursor layers for nanostructured applications using magnetron sputtering

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Titanium dioxide nanotubes are promising nanomaterials with wide-range potential applications in energy, environmental, and medical fields, driven by their tunable structure and exceptional properties. However, pure TiO2 nanotubes usage is limited by relatively wide energy gap.
The fabrication and oxidation processes of iron-doped titanium nanotubes were investigated. The structural and morphological properties of precursor films prepared by magnetron sputtering was analyzed. Advanced characterization techniques, including scanning electron microscopy (SEM) and energy-dispersive spectroscopy (EDS), were used to examine the relationship between the amount of iron and material characteristics. Optimized precursor films were deposited by magnetron sputtering. The as-deposited films were subsequently oxidized in an organic-based electrolyte to obtain an oriented array of Ti-Fe nanotubes. To improve their sensorics properties, the samples were annealed.

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