

## **TiO<sub>2</sub> nanotubular structures, synthesis and different applications**

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TiO<sub>2</sub> nanotubular structures NTs are promising materials for gas sensing, optoelectronic and photonic applications. One of the key points in these applications is the possibility to control the morphology, dimensions of individual TiO<sub>2</sub> nanotubes and architecture of their spatial networks. This can be achieved, in particular, by changing the electrochemical anodization temperature of the Ti foil. Spectral distribution of cathodoluminescence from a cluster of nanotubes clearly demonstrates the formation of whispers gallery resonator modes, effect which could be used for development of laser elements based on single TiO<sub>2</sub> NT. Optical waveguides based on controlled modification of the crystalline structure of nanotubular matrices by focused laser beam irradiation have been developed. Besides, we show that TiO<sub>2</sub> singular nanotubes can be implemented as sensing elements in gas sensors integrated on chip. The possibility for use of metallized TiO<sub>2</sub> nanotubular structures as cost-effective focusing elements with negative refractive index will be presented.

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