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METAL ALKOXIDE GEL FILM CRACKING AND ROLLING INTO TUBULAR MICROSTRUCTURES

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Inorganic nano- and microtubes with different morphologies have been obtained from a variety of materials [1-3]. Amongst others different metal oxide nano- and microtubular materials have been a subject of intensive research, possible applications include photo-catalysis [4,5], sensors [5,6] photovoltaics [7], biomaterials, drug delivery and controlled release [8].

We have introduced [9] a novel strategy for obtaining tubular oxide structures, which for the first time combines sol-gel method with self-formation by film rolling. This non-template synthesis includes the steps of gelling the surface of a metal-alkoxide precursor, spontaneous cracking of obtained gel film, subsequent dissolving of the non-gelled layer of precursor and self-rolling of gel film segments. SEM images indicate that the TiO₂, ZrO₂ and HfO₂ structures obtained thereby are essentially rolled-up metal oxide sheets. Our more recent work has been aimed at further characterization, explaining and modelling the structure formation processes and finding applications for this novel material.

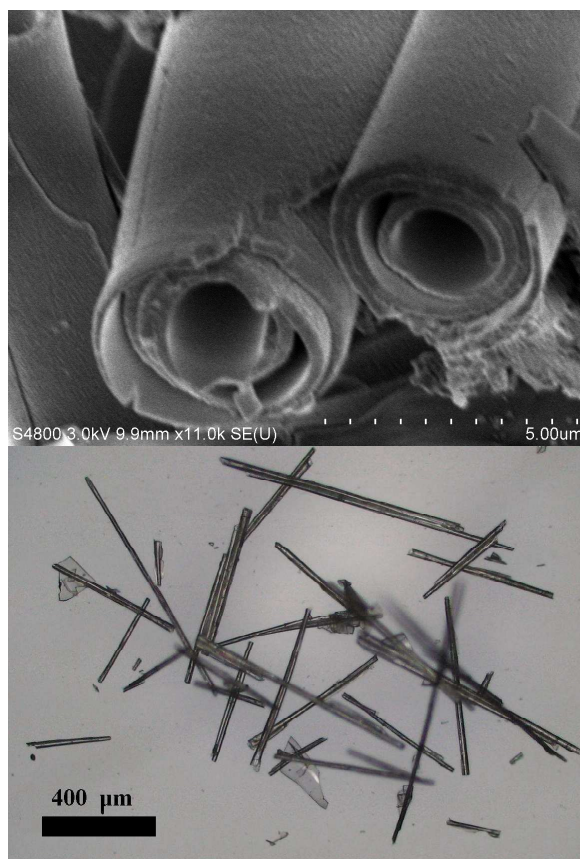


Fig.1. SEM micrographs of zirconium oxide microrolls obtained by metal alkoxide gel sheet rolling.

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