COLLOID SYNTHESIS OF CdS, V$_2$O$_5$ AND WO$_3$ DOPED TITANATE FILMS FOR SENSOR APPLICATION
- in short presentation -

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SHORT PRESENTATION

Semiconductor nanoparticles (CdS, V$_2$O$_5$ and WO$_3$) were incorporated into the trititanate layers to examine their influence on the photovoltaic properties of pure titanate powder.

Na$_2$Ti$_3$O$_7$ with layered structure was prepared from a 1:3 molar mixture of powdered Na$_2$CO$_3$ and TiO$_2$ by heating at 800°C for 2 hours, after that the Na$^+$ ions were exchanged for H$^+$ ions by hydrochloric acid treatment.

H$_2$Ti$_3$O$_7$ samples dispersed in liquids of various compositions and polarities were used for the preparation of self-assembled titanate/polymer films for further sensor applications.
Self-assembled nanofilms were built up from colloidal suspension of negatively charge semiconductor nanoparticles and positively charged PDDA solution by layer-by-layer method (see fig. 3.).

CdS, $\text{V}_2\text{O}_5$ and $\text{WO}_3$ nanoparticles were incorporated into the titanate layers. CdS nanoparticles were generated from their precursors in the interlayer space. $\text{V}_2\text{O}_5$, $\text{WO}_3$ nanoparticles were prepared by sol-gel method from $\text{V}_2\text{O}_5$ crystallite and metallic tungsten in a solution of hydrogen peroxide. Before the intercalation of semiconductor nanoparticles into the layers, those were pre-expanded by incorporation of n-butilammonium ions.

Titanates, their composites and the self-assembled hybrid structures (titanate/polymer/semiconductor) were characterized by X-ray diffraction, optical, electron and atomic force microscopic measurements.