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COLLOID SYNTHESIS OF CdS, V_2O_5 AND WO_3 DOPED TITANATE FILMS FOR SENSOR APPLICATION - in short presentation -

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SHORT PRESENTATION

Semiconductor nanoparticles (CdS, V_2O_5 and WO_3) were incorporated into the trititanate layers to examine their influence on the photovoltaic properties of pure titanate powder.

$Na_2Ti_3O_7$ with layered structure was prepared from a 1:3 molar mixture of powdered Na_2CO_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.

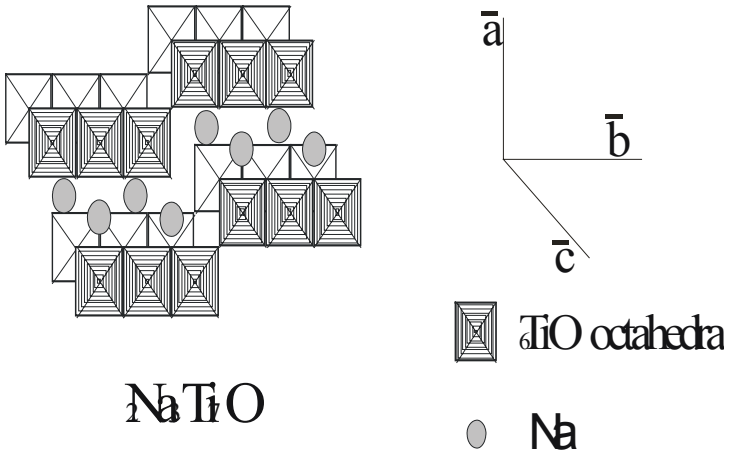

FIGURE 1. SCHEMATIC STRUCTURE
OF LAYERED SODIUM TRITITANATE

$H_2Ti_3O_7$ samples dispersed in liquids of various compositions and polarities were used for the preparation of self-assembled titanate/polymer films for further sensor applications.

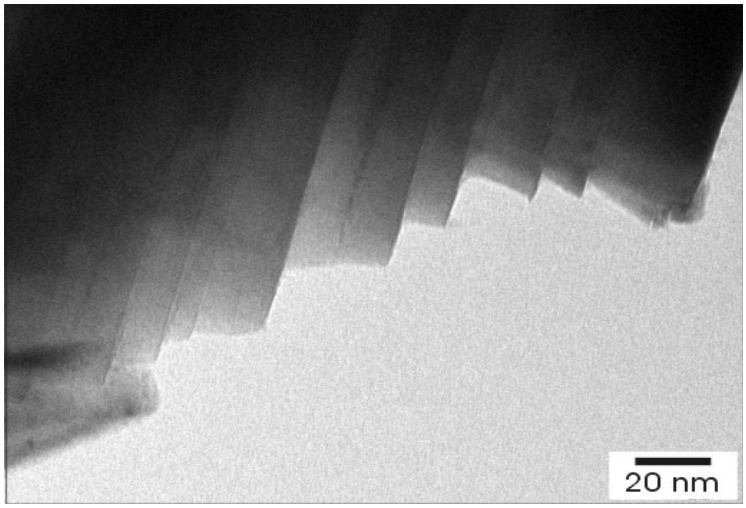

FIGURE 2. TEM PICTURE OF LAYERED SODIUM TRITITANATE

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.).

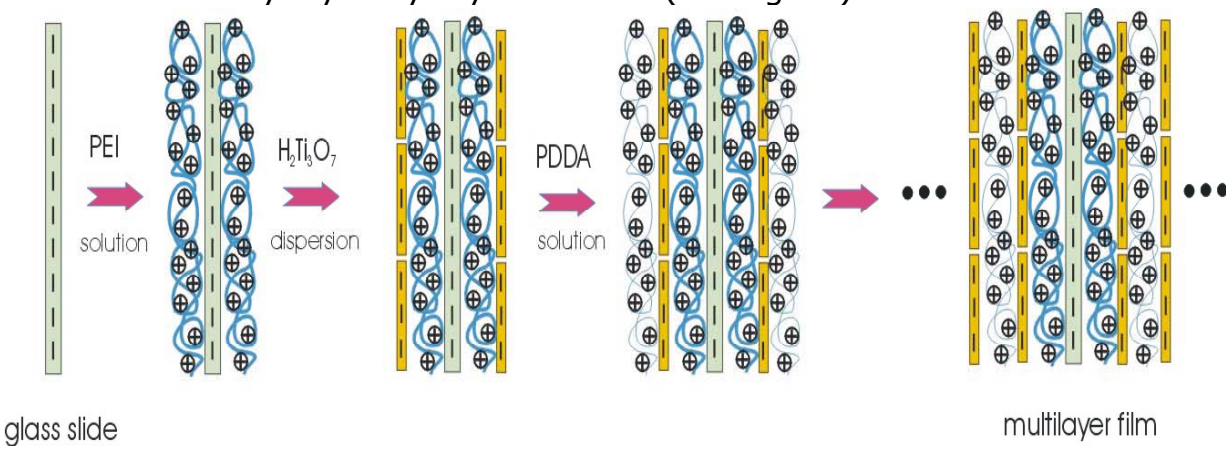

FIGURE 3. SCHEMATICAL REPRESENTATION OF PREPARATION OF SELF-ASSEMBLEY FILMS

CdS, V_2O_5 and WO_3 nanoparticles were incorporated into the titanate layers. CdS nanoparticles were generated from their precursors in the interlayer space. V_2O_5, WO_3 nanoparticles were prepared by sol-gel method from V_2O_5 crystallite and metalic tungsten in a solution of hydrogen peroxide. Before the intercalation of semiconductor nanoparticles into the layes, 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.