PHOTOCATALYTICAL APPLICATION OF TiO$_2$/SiO$_2$
AND ZINC-ALUMINUM LAYER DOUBLE HYDROXIDE
MULTI-LAYERED NANOFILMS PREPARED
BY LBL IMMERSION METHOD
- in short presentation -

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SHORT PRESENTATION

Multilayered self-assembled films from colloidal particles with
constant or variable surface charge were prepared on the surface of glass
plates using the “layer by layer” (LBL) immersion technique.

As spherical particles with variable surface charge, TiO$_2$
photocatalysts and silica sol particles were used for the preparation of
multilayered, up to 20-layer films. Lamellar particles of zinc-aluminum
layer double hydroxide (LDH) with constant surface charge was a
suspension (ZnAl-LDH), which were deposited on the surface of glass
plates using the LBL dipping technique.

The multilayer preparation was monitored by absorbance
measurements at the wavelength of $\lambda = 500$ nm. The buildup of the ZnAl-
LDH layers was controlled by XRD measurements. The thickness of the
films were found to vary between 40-100 nm in the case of TiO$_2$, and 150-
1000 nm in the case of ZnAl-LDH containing films.

By the photocatalytic experiments a photoreactor equipped with a
400 W high-pressure mercury lamp was applied (Fig. 1). The emitted UV-
photons below 320 nm were cut off using glass reaction vessel. Acridine-
Orange (AO) organic dye was degraded in the experiments.

A spectrophotometer with a flow type cell has been connected to the
reactor in order to measure continuously the absorbance of the organic
dye solution, which was circulating at constant rate during the irradiation.
The absorbance maximum of the dye at $\lambda = 493$ nm gradually decreases,
corresponding to the decrease in the concentration of residual AO in the
solution, due to degradation, presented on Fig. 2.
The TiO$_2$, TiO$_2$/SiO$_2$ multilayered films and ZnAl-LDH multilayered films (see Fig. 3) were photocatalitically active in the destruction of acridine orange.
The photocatalytic efficiency of the new ZnAl-LDH photocatalyst is close to the well-known P25 Degussa titanium dioxide.