

## Physico-Chemical nanomaterials science

### Photocatalytically enhanced organic dye removal with ZnAl layered double hydroxides and its derivatives

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Layered double hydroxides (LDHs) have a layered structure which enables specific properties of these materials and their thermally derived mixed oxides such as redox and acid-base properties, developed surface area, mesoporosity, ion exchange capability, etc. Traditional LDHs find application as adsorbents for use in waste water treatment and environmental remediation. Their modification using surfactant sodium dodecylsulfate (DS) increases the affinity of LDHs for cationic and neutral organic compounds. Recently, LDHs have already been proven as efficient photocatalysts to perform the oxidation of some organic compounds.

This work aims to present a study of the adsorption and photocatalytic destruction of cationic dye Methylene blue by ZnAl LDHs, their calcined and DS-modified forms. ZnAl LDHs with Zn:Al ratio= 1:2, 1:3, 1:4 were synthesized by coprecipitation method and were characterized by XRD, FTIR, DTA-DTG, DR-UV-Vis. The reaction progress was verified by UV/vis spectrophotometry.

The best removal of MB from aqueous solutions was observed for ZnAl LDHs modified with DS. The results on MB removal by adsorption and photocatalysis for different forms of LDHs with Zn:Al ratio 4:1 are presented in Table 1.

Table. MB removal from aqueous solutions with ZnAl LDHs, it calcined and DS-modified forms

Sample	C <sub>0</sub> (MB) , mol/l	Adsorption %	Photodestruction, %	Total	
				%	mg/g
blank	2*10 <sup>-5</sup>	–	18	18	–
Zn <sub>4</sub> Al LDH	2*10 <sup>-5</sup>	5	71	76	9.7
Zn <sub>4</sub> Al oxides	2*10 <sup>-5</sup>	15	73	88	11.3
Zn <sub>4</sub> Al LDH/ DS	9*10 <sup>-5</sup>	75	21	96	55.3