PHOTOCATALYTIC ACTIVITY OF Mo-DOPED $LiInO_2$ IN DEGRADATION OF AMITRIPTYLINE FROM WASTEWATERS

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Abstract

Lithium-indium oxide is a high density, wide band-gap semiconductor with promising applications for scintillating detection of solar neutrinos as well as for efficient phosphorescence when doped with different rare earth ions. Previously, we have examined the photocatalytic efficiency of $LiInO_2$ powder, synthesized using a simple solid-state method, and it has proved to be a promising photocatalyst in alprazolam photodegradation under UV irradiation [1]. Recently, it was found that doping $LiInO_2$ with Mo^{6+} ions can greatly enhance the degradation of methylene blue under visible light irradiation by tailoring the band-gap of $LiInO_2$ and extending its light absorption into the visible spectral range [2].

In this research we prepared $LiInO_2$ powders with 0, 3, and 6at% of Mo^{6+} using a two-step mechanochemical procedure followed by annealing. X-ray diffraction measurements confirmed materials tetragonal structural form (with space group: $I4_1/amd$), while the microstructure of obtained powders was observed using scanning electron microscopy. Preliminary results of the efficiency of the Mo-doped $LiInO_2$ powders were obtained in the photocatalytic degradation of amitriptyline under simulated solar irradiation.

Namely, amitriptyline, a widely consumed psychiatric pharmaceutical from the tricyclic antidepressant class [3], is used for the relief of mental depression, including clinical/endogenous depression [4]. Pharmaceuticals like this are lagging behind in treated waters even after their purification and it is necessary to find efficient method for their complete removal, whereas the use of the advanced oxidation processes proved to be the most effective way.

References

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