

# The synthesis of ZnO nanosheets by exfoliation of inorganic/organic hybrids of ZnO/SDS compounds

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## Abstract

Inorganic/organic hybrids have been studied with a growing interest in the past decades due to their potential applications. In this study, synthesis of inorganic/organic hybrid multilayer of zinc oxide (ZnO) and dodecyl sulphate ( $\text{DS}^-$ ) was performed by cathodic electrodeposition process. The nanosheets of ZnO were synthesized after the exfoliation of hybrid films. The effect of La ions on synthesizing of hybrid films and developing nanosheets was also studied.

## Results

X-ray diffraction pattern (Fig. 1) of the deposited films shows Bragg peaks appearing in low angle region. The basal spacing calculated was 3.2 nm attributed to the intercalation of  $\text{DS}^-$  ions as guest compounds. FTIR spectra also confirm the existence of the  $\text{DS}^-$  molecules in the interlayer domain. Besides (00 n) peaks the, XRD pattern shows various after  $2\theta = 30^\circ$  due to the existence wurtzite ZnO structure as well (marked as square in Fig. 1). SEM micrograph of deposited films shows both the

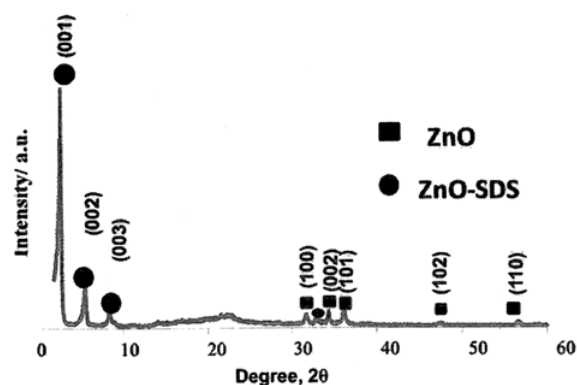


Fig 1. XRD pattern of ZnO films containing  $\text{DS}^-$

morphology of the lamellar ZnO crystals and wurtzite ZnO structure. Each ZnO slab has a lateral size of around  $2\ \mu\text{m}$ . According to the TG/DTA analysis, the lamellar structures are not thermally stable because of their thin inorganic layers and decomposed above  $150^\circ\text{C}$ .

## Conclusion

Synthesis of inorganic/organic hybrid multilayer of zinc oxide (ZnO) and dodecyl sulphate ( $\text{DS}^-$ ) was carried out by cathodic electrodeposition process. The exfoliation of the hybrids was succeeded in butanol solution. The addition of La ions helps to obtain platelet like structures and obtaining nanosheets.