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Purpose of the work

To synthesize of nanocrystalline CuO-ZnO film by solid-phase pyrolysis, to study the phase composition, morphology of the obtained materials.

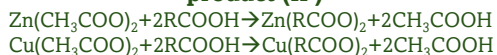
Characterization

- X-ray phase analysis (XRD), ARL'XTRA diffractometer, $\text{CuK}_{\alpha 1}$ radiation.
- Scanning electron microscopy (SEM), scanning electron microscope Nova Nanolab 600.

Synthesis scheme

The precursors: $\text{Zn}(\text{CH}_3\text{COO})_2 \cdot 2\text{H}_2\text{O}$,
 $\text{Cu}(\text{CH}_3\text{COO})_2 \cdot 2\text{H}_2\text{O}$.
molar ratio of Cu:Zn is 1:99 and 5:99.

Stage 1: Synthesis of the intermediate product (IP)



Stage 2: Synthesis of film materials

Dissolution of IP in an organic solvent

Preparation of the substrates

Applying the intermediate product solution on the prepared substrates

Calcination for 2 hours при 600 °C

SEM

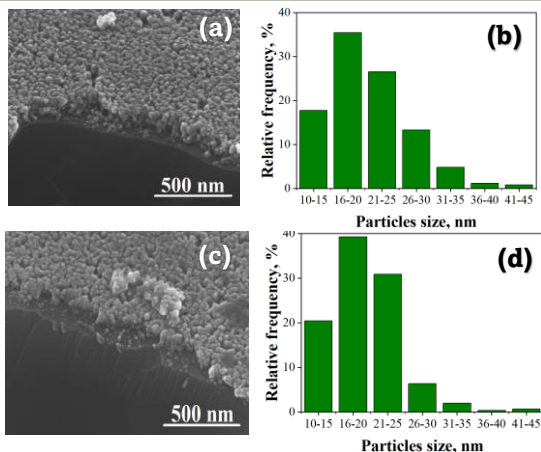


Fig. 2. SEM images (a, c) and the size distribution of crystallites (b, d) for CuO-ZnO with Cu:Zn=1:99 (a, b) and 5:95 (c, d).

XRD

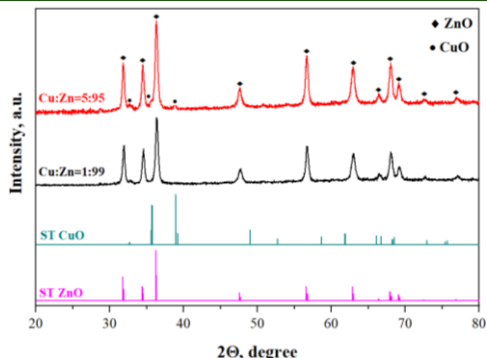


Fig. 1. X-ray patterns of CuO-ZnO with molar ratio of Cu:Zn is 1:99 and 5:99.

Optical properties

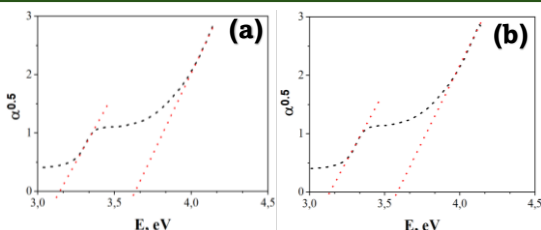


Fig. 3. Determination of the indirect interband transitions for materials CuO-ZnO with Cu:Zn=1:99 (a, b) and 5:95 (c, d).

Conclusion

- Nanocrystalline CuO-ZnO thin films were obtained by pyrolysis.
- The obtained materials have a composite structure and consist of two phases.
- The average size of particles is 18 nm.
- The films is transparent in the visible range.

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