

Prospective analysis of optoelectronic properties of ZnSnN₂ for future tandem solar cells.

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The nitrides of elements III such as Al_xGa_yIn_{1-x-y}N have been widely studied for optoelectronic applications and are of specific interest for solar cells. Unfortunately, made with indium, they will most likely suffer about the possible absence and / or increase of indium prices due to, for example, its use in flatscreen market.

In this context, other alloys such as Zn-IV-N₂ type II-IV nitrides have recently been suggested in which the element IV may be Sn, Ge or Si. The ZnSnN₂ seems to have suitable properties and is composed of abundant and non-toxic elements. Studies on ZnSnN₂ are nevertheless scarce and its properties are still poorly known.

This work presents a first analysis of the optoelectronic properties of ZnSnN₂. The films were made by sputtering and their stoichiometry was controlled to span from near-stoichiometric to excess zinc content. Advanced characterization techniques such as photoconductivity and absorption spectroscopies are used to obtain the optoelectronic response. Then, structural analyzes of the ZnSnN₂ deposited on both glass and silicon substrates are done using Spectroscopy Raman and Atomic Force Microscopy. Finally, the band gap alignment is studied *in situ* during the growth process using an XPS setup connected under UHV to the deposition system.

References:

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