

ZINC AMIDE COMPOUNDS AS POTENTIAL PRECURSORS FOR THE SYNTHESIS OF ZINC NITRIDE

Eva Maile, Anjana Devi, R.A. Fischer*
Lehrstuhl für Anorganische Chemie II,
Organometallics & Materials Chemistry,
Ruhr-Universität Bochum,
Universitätsstraße 150, 44780 Bochum,
Germany.
Roland.Fischer@ruhr-uni-bochum.de

Zinc nitride is, in contrast to cadmium-containing materials, a non-toxic semiconductor with an optical band-gap in the VIS/NIR. There are very few compounds known so far, which have the potential to be used as precursors for MOCVD of zinc nitride. For this reason, we synthesized zinc compounds with nitrogen bonded ligands. The heteroleptic zinc amides 3,3'-Imino bis(N,N-dimethylaminopropyl) zinc [bis(trimethylsilyl)-amide] and N,N-Dimethyl-N'-ethyl-ethylene-diamin zinc [bis(trimethylsilyl)amide] were synthesized by salt metathesis reaction. Furthermore, [(Diethylamino) propyl] zinc azide was resulted of the reaction between Bis-[(Diethylamino)propyl]zinc chloride] and an excess of sodium azide. These three compounds are looking promising for further applications in the preparation of nano scaled materials and thin films using MOCVD.

The known compound Bis-[Bis-(Trimethylsilyl)amido] zinc was synthesized via salt-metathesis reaction. It was used as a single molecule precursor for MOCVD of thin, crystalline zinc nitride films with using ammonia as reactive gas. The films were characterized by XRD, SEM and XPS. The dense and homogenous film growth can be showed in figure 1. Reflexes for cubic zinc nitride were observed in the XRD patterns (figure 2). A small shift between the expected ratio between the intensities can be seen, but the films were not epitaxial. The XPS spectra (figure 3) showed signals of zinc and nitrogen, but there were indications of surface carbon contamination. The peaks corresponding to iron originate from the sample holder.

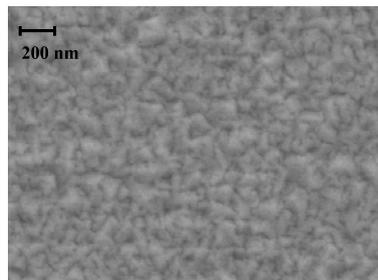


Fig. 1 SEM of a Zn_3N_2 film grown on Si(100)

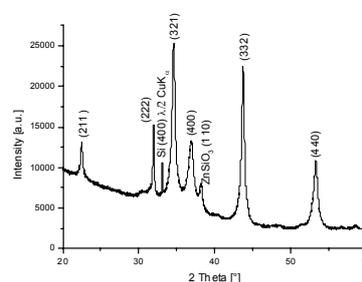


Fig. 2 XRD of a Zn_3N_2 film grown on Si(100)

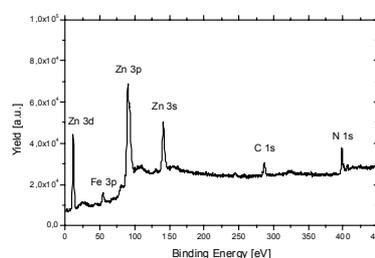


Fig. 3 XPS of a Zn_3N_2 film grown on Si(100)