



Contribution ID: 96

Type: **Oral contribution**

Tuning the structural and electronic properties of strontium titanate thin films by Ni doping

Thursday 18 March 2021 10:55 (20 minutes)

We report the fabrication of SrTiO₃ thin films doped by Ni and its influence on the electronic structure. The SrTiO₃ thin films were deposited by magnetron sputtering which is suitable for mass-production of samples adapted for nanoelectronic applications. The structure of the STO:Ni was investigated by XRD phase analysis. We evaluated the influence of Ni on crystallinity, the size of coherent diffract areas, and micro-stress in the lattice of STO as a function of Ni concentration[1]. The second part of the presentation deals with the study of the electronic band structure of STO films doped with Ni, high-quality ordered pristine and SrTiO₃:Nix films with x=0.06 and 0.12 were prepared by pulsed laser deposition. Electronic band structure calculations for the ground state, as well as one-step model photoemission calculations performed by using the Korringa-Kohn-Rostoker Greens's function method, predicted the formation of localized 3d-impurity bands in the bandgap of SrTiO₃ close to the valence band maxima. The measured valence bands at the resonance Ni2p excitation and band dispersion are in agreement with theory[2].

References:

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Session Classification: Energy materials: batteries, photovoltaics, etc.

Track Classification: Energy materials: batteries, photovoltaics, etc.