



Contribution ID: 335

Type: Poster

Stabilisation of tetragonal ZrO₂ by oxygen plasma treatment of sputtered ZrCu and ZrAl thin films

Wednesday 20 June 2018 18:00 (20 minutes)

The stabilization of tetragonal zirconium dioxide (zirconia) by doping at room temperature has already been carried out with dopant materials like Y or Mg. In the present work it was investigated if stabilization is possible with alternative dopants like Al and Cu. The films were produced with a dual cathode magnetron sputtering device. Because it is expected that the stabilization depends on the dopant concentration, the Zr coatings were produced with a dopant gradient. So it was possible to investigate many different compositions with only few samples. This dopant gradient could be produced with a modification of the substrate holder in the sputtering chamber where a small wall partially shadows the vapor beam of the dopant. After production of the ZrAl and ZrCu samples, first their chemical composition was determined by energy dispersive X-ray spectroscopy in a scanning electron microscope. Then they were treated with oxygen plasma. Depth profiles were recorded by Auger electron spectroscopy to investigate the progress of the oxidation. For crystallographic analysis X-ray diffraction was used. The surface morphology was measured with an atomic force microscope.

The results show that the stabilization worked successfully with Cu while for Al no formation of the tetragonal phase was observed. In addition the results show that oxygen treatment time and power could be important parameters for the formation of tetragonal zirconia.

Author: Dr KOVAC, Janez (Jozef Stefan Institute)

Co-authors: Prof. EISENMENGER-SITTNER, Christoph (Institute of Solid State Physics, Vienna University of Technology); Mr NÖBAUER, Christian (Institute of Solid State Physics, Vienna University of Technology); Prof. MOZETIČ, Miran (Jozef Stefan Institute); Dr ZAPLOTNIK, Rok (Jozef Stefan Institute)

Presenter: Dr KOVAC, Janez (Jozef Stefan Institute)

Session Classification: Poster Session Wednesday

Track Classification: Thin Film & Surface Engineering