MI 10: Positron Annihilation Spectroscopy (PALS)

Chair: Hartmut S. Leipner (Martin-Luther-Universität Halle-Wittenberg)

Time: Thursday 12:00–12:30 Location: MER 02

MI 10.1 Thu 12:00 MER 02

Positron Annihilation Spectroscopy for Materials Science — •Andreas Wagner[1], Wolfgang Anwand[1], Reinhard Krause-Rehberg[2], Maciej Oskar Liedke[1], Kay Potzger[1], and Thu Trang Trinh[1,3] — [1]Helmholtz-Zentrum Dresden-Rossendorf — [2]Martin-Luther-Universität Halle — [3]Technische Universität Dresden, Germany

Positron annihilation lifetime spectroscopy serves as a tool for studies of open-volume defects in solid materials such as vacancies, vacancy agglomerates, dislocations, pores and voids. The intense mono-energetic positron beam MePS installed at the superconducting electron accelerator ELBE allows for depth-dependent positron lifetime measurements and Doppler-broadening spectroscopy of thin films. Offline experiments using a radioisotope-based beam called SPONSOR complement those investigations. Here, in-situ modifications of the samples under study can be performed using a new setup called AIDA which allows for thin film growth by molecular beam epitaxy, ion-beam irradiation and sputtering in a temperature-controlled environment reaching from 50 K to 1200 K.

Selected experiments on open and closed porosity in thin films, positron chemistry in fluids, defect characterizations of semiconductors and metals will be presented.

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MI 10.2 Thu 12:15 MER 02

Microstructural Changes in Welded AlCuLi-Alloys by Positron Annihilation Spectroscopy (PALS), SAXS and DSC — •Danny Petschke, Frank Lotter, and Torsten Staab — University Wuerzburg, Department of Chemistry, LCTM Röntgenring 11, 97070 Wuerzburg, Germany

We follow changes in the microstructure at several distances from the weld nugget of friction stir welded AlCuLi-alloy (AA2198) plates occurring due to the tool movement and the created heat by employing different methods: Small Angle X-ray Scattering (SAXS), giving information on type, size and density of precipitates, Differential Scanning Calorimetry (DSC), giving information on formed precipitates by their dissolution signal, and positron annihilation lifetime spectroscopy (PALS), being sensitive to vacancies and dislocations as well as to the formation and growth of precipitates. We start by characterizing the base material as a reference and proceed via the heat-affected zone to the weld nugget. By the use of complementary methods, we obtain information on structure, kind and distribution of precipitates and correlate this with hardness measurements.