



Contribution ID: 46

Type: Poster

## P93 - Study of the oxygen depth profile of welded joints using PIGE, RBS and NRA techniques at various deuteron energies

Friday, 11 July 2014 13:00 (1 hour)

The selection and optimization of the proper welding technology is a key factor in the production of steel structures, for which, the understanding and specific utilization of the physical processes is necessary. The oxygen content of the applied shield gas is one of the most important parameter in welding process, which significantly influences the mechanical properties of a welded joint.

In order to study the oxygen content and characterize the oxygen depth profile on the surface of welded joints, Particle Induced Gamma-ray Emission (PIGE), Rutherford Backscattering Spectrometry (RBS) and Nuclear Reaction Analysis (NRA) were used. The measurements were carried out on several deuteron energies (1.0-1.8 MeV) by the scanning nuclear microprobe of MTA Atomki using HPGe and ion-implanted silicon detectors. From oxygen and carbon elemental maps, suitable regions were chosen for depth profile determination. Instead of using standards the oxygen and carbon depth profiles of the surface were calculated on the basis of the gamma-ray and particle production cross sections [1,2].

This study demonstrates the advantages of the deuteron induced ion beam analytical techniques by nuclear microprobe, utilized in oxygen depth profiling in steel.

The work was supported by the IAEA Coordinated Research Project "Reference Database for Particle-Induced Gamma-ray Emission (PIGE) Spectroscopy" (Contract No. 16967/R1).

[1] G.Á. Sziki, A. Simon, Z. Szikszai, Zs. Kertész, E. Dobos, Nuclear Instruments and Methods in Physics Research B 251 (2006) 343-351.

[2] L. Csedreki, I. Uzonyi, G.Á. Sziki, Z. Szikszai, Gy. Gyürky, Á.Z. Kiss, Nuclear Instruments and Methods in Physics Research B, in press.

**Primary author:** Mr CSEDREKI, László (Institute for Nuclear Research, Hungarian Academy of Sciences, H-4001 Debrecen, P. O. Box 51, Hungary)

**Co-authors:** Mr JURÁNYI, Attila (University of Miskolc, Department of Physical Metallurgy and Metalforming, H-3515 Miskolc, Hungary); Dr HUSZANK, Róbert (Institute for Nuclear Research, Hungarian Academy of Sciences, H-4001 Debrecen, P. O. Box 51, Hungary)

**Presenter:** Dr HUSZANK, Róbert (Institute for Nuclear Research, Hungarian Academy of Sciences, H-4001 Debrecen, P. O. Box 51, Hungary)

**Session Classification:** Poster Session with Cheese and Wine