

Nuclear Analytical Chemistry at Heinz Maier-Leibnitz Center (MLZ), Garching

Zsolt Révay

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The FRMII reactor at MLZ operates the strongest cold neutron beam and it serves as the neutron source of the prompt gamma activation analysis (PGAA) facility. The flux is high enough to activate the samples, so it is also used for neutron activation analysis (NAA). When combined with PGAA, in this so-called in-beam activation analysis we get a significantly broader circle of elements. PGAA is used for the determination of the major and minor components, typically the light elements, while NAA's strength lies in the precise determination of trace elements. Thus, the two methods complement each other, and at MLZ, it can be performed at one instrument. For lower activities, a low-background counting chamber is also available. For gamma-ray detection, we use Compton-suppressed HPGe detectors. A relatively new Neutron Depth Profiling (NDP) setup shares the beam time with the analytical measurements. The low background conditions allow for a large profiling depth (nearly 50 microns for Li) and this makes it advantageous in the investigation of lithium-ion batteries. Prompt Gamma Activation Imaging (PGAI) is still under development and it serves for 3-D scanning of complex objects, determining the major components in a few-cubic-millimeter spots thus generating 3-D elemental maps. In addition, the FRM II reactor is also equipped with highly thermalized irradiation channels which are ideal for Instrumental NAA, where the samples are transferred to the counting lab using a rabbit system. Along with the beam techniques, INAA is offered in the user program at MLZ. The analytical facilities have been used in a broad range of applications, e.g. for archaeological objects, air filters, geological or environmental samples, high-tech materials, as well as in nuclear physics.

Speaker Biography

Zsolt Révay is an expert in radiochemistry and prompt gamma activation analysis (PGAA) with a PhD from the University of Veszprém. In 2010, he was awarded Doctor of Sciences at the Hungarian Academy of Sciences. For the period 1992-2010, he was responsible for PGAA at the Budapest Neutron Center, where he developed the analytical method and spectroscopy database. He is currently leader of the analytical chemistry group MLZ, Technical University Munich. He also serves as the Editor-in-Chief of the Journal of Radioanalytical and Nuclear Chemistry.

Tuesday, October 17, 2023

10:45 AM (UTC-05:00) Eastern Time (US & Canada) | Hybrid format

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