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Recent advancements in energy-dispersive neutron imaging at LANSCE

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We recently applied novel detector technology for the first time to perform element-specific neutron imaging at LANSCE. Utilizing neutron absorption resonances, we were able to image the tungsten and uranium concentrations in mock-up nuclear fuel pellets enclosed in a steel cladding. Several uranium pellets were sintered in contact with tungsten metal plates, leading to diffusion of the tungsten into the uranium matrix. With energy-dispersive neutron radiography we were able to collect data that allowed to reconstruct the tungsten distributions in the pellets. Similarly, we examined fragments of the Chelyabinsk meteorite and were able to non-destructively visualize iron grains by detecting resonances of cobalt impurities in the iron. This contribution will provide an overview of our recent work. Furthermore, we will discuss the application of Bragg-edges for energy-dispersive neutron imaging.

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