

Abstract Submitted  
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**Neutron Focusing Mirrors for Neutron Radiography of Irradiated Nuclear Fuel at Idaho National Laboratory**<sup>1</sup> DURGESH K. RAI, Massachusetts Institute of Technology, HUARUI WU, Tsinghua University, MUHAMMAD ABIR, JEFFREY GIGLIO, Idaho National Laboratory, BORIS KHAYKOVICH, Massachusetts Institute of Technology — Post irradiation examination (PIE) of samples irradiated in nuclear reactors is a challenging but necessary task for the development on novel nuclear power reactors. Idaho National Laboratory (INL) has neutron radiography capabilities, which are especially useful for the PIE of irradiated nuclear fuel. These capabilities are limited due to the extremely high gamma-ray radiation from the irradiated fuel, which precludes the use of standard digital detectors, in turn limiting the ability to do tomography and driving the cost of the measurements. In addition, the small 250 kW Neutron Radiography Reactor (NRAD) provides a relatively weak neutron flux, which leads to low signal-to-noise ratio. In this work, we develop neutron focusing optics suitable for the installation at NRAD. The optics would separate the sample and the detector, potentially allowing for the use of digital radiography detectors, and would provide significant intensity enhancement as well. The optics consist of several coaxial nested Wolter mirrors and is suited for polychromatic thermal neutron radiation.

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