

MEASUREMENT OF NEUTRON TRANSMISSION FACTOR AND TOTAL CROSS SECTION OF VANADIUM IN THE WAVELENGTH RANGE 0.5–10 Å AT THE YuMO FACILITY

T.V. Cuong^{1,2}, O.I. Ivanov¹, A.Kh. Islamov¹, A.H.A. Elmekawy¹, A.I. Kuklin^{1,3}

¹ *Joint Institute for Nuclear Research, Dubna, Russia*

² *Dalat Nuclear Research Institute, Dalat, (Viet Nam)*

³ *Moscow Institute of Physics and Technology, Moscow, Russia*

E-mail: cuongtv@dnri.vn, alexander.iw.kuklin@gmail.com

We report measurements of the neutron transmission factor through high-purity (99.4%) vanadium over the wavelength range 0.5–10 Å to evaluate its suitability as a reference material for small-angle neutron scattering (SANS). The experiments were performed at the YuMO instrument [1] at the IBR-2 reactor, where a direct-beam detector was used to record the transmitted neutron spectrum at the beam center. Five vanadium samples with thicknesses of 0.15, 0.45, 0.53, 3.02 and 3.3 mm were investigated. The total neutron cross sections were derived from the measured transmission data and compared with the evaluated nuclear data libraries, including ENDF/B-VIII.0[2] and ROSFOND-2010[3]. Good agreement within the experimental error was observed, confirming the reliability of the measurements. Based on the transmission behavior, an optimal thickness range for vanadium reference standards in SANS experiments at the IBR-2 facility is identified.

- [1] A. I. Kuklin, et al (2012). Past and present of time-of-flight small-angle neutron scattering at IBR-2, *Journal of Physics: Conference Series*, vol. 351, no. 1, p. 012001, 2012, doi: 10.1088/1742-6596/351/1/012001.
- [2] M. Chadwick and et al (2018). ENDF/B-VIII.0: The 8th major release of the nuclear reaction data library, vol. 148, *Nuclear Data Sheets*, Feb 2018, pp. 1-142.
- [3] S. Zabrodskaya and et al (2007). ROSFOND—Russian national library of evaluated neutron data, Vols. Nuclear Constants 1-2, VANT, 3 (2007).