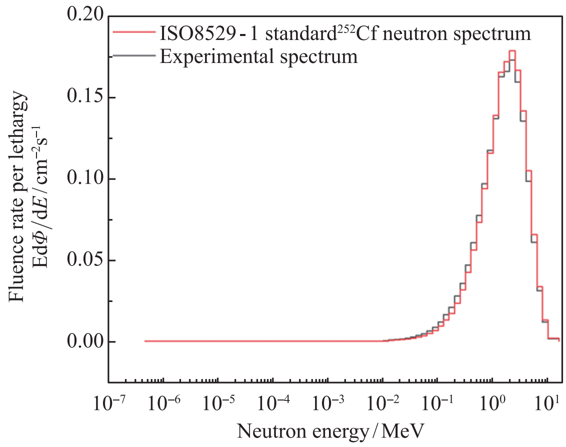

Fig. 1 (color online) Comparison of unfolding ^{252}Cf neutron spectrum of the EBSS and the ISO 8529-1 standard ^{252}Cf neutron spectrum.

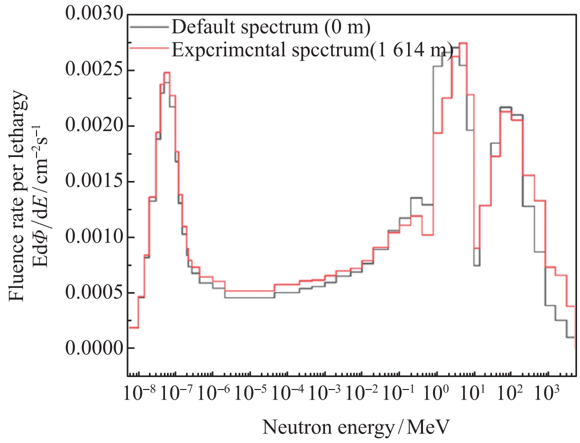

Fig. 2 (color online) Comparison of the experimental spectrum and the default spectrum obtained by Goldhagen, *et al.*

References

[1] M. Kowatari, K. Nagaoka, S. Satoh, et al., J. Nucl. Sci. Technol. 42(2005)495.

[2] P. Goldhagen, M. Reginatto, T. Kniss, et al., Nucl. Instrum. Meth, 476(2002)42.

6 - 19 Excitation Functions for Fast-neutron Induced Reactions on Zinc

Liu Bingyan, Tian Guoyu, Han Rui, Shi Fudong, Sun Hui, Zhang Zekun and Chen Zhiqiang

Zinc is important in reactor to decrease the radiation fields and primary water stress corrosion cracking[1].

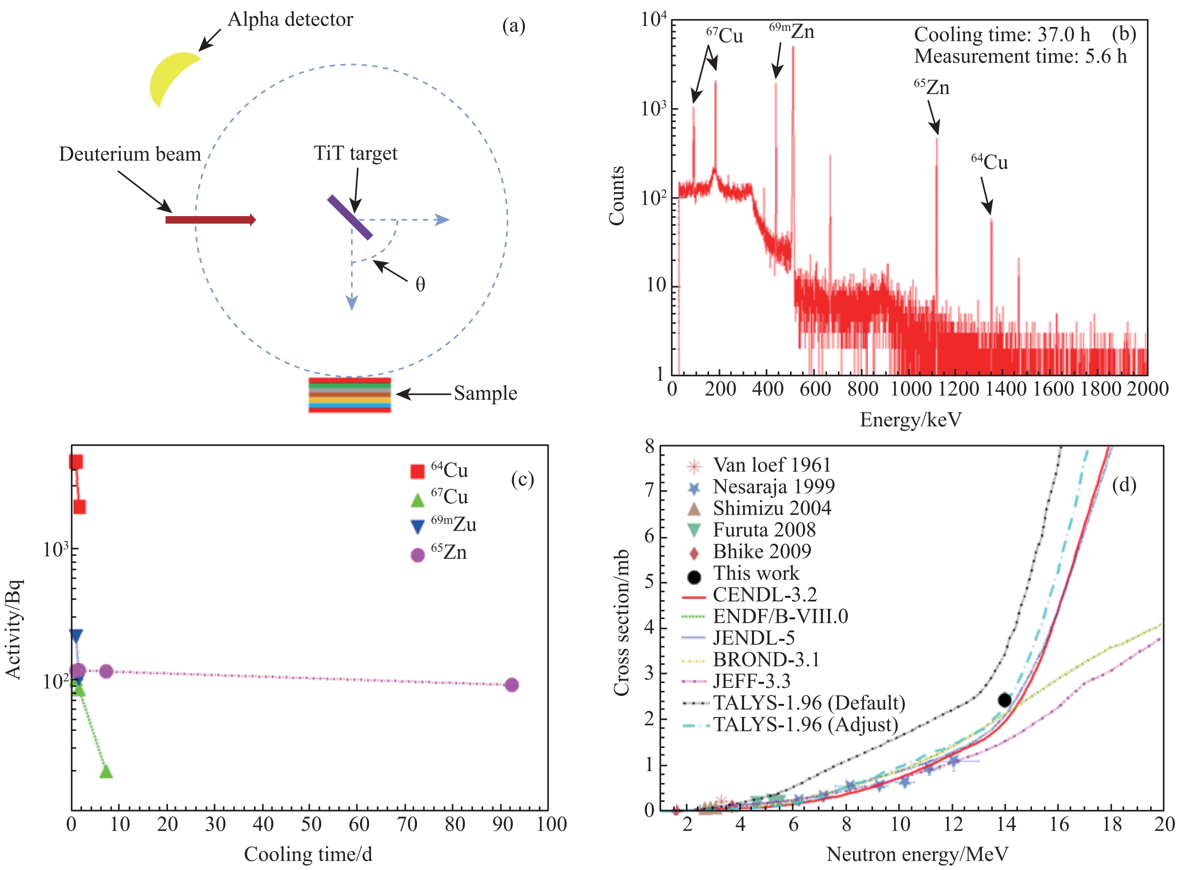

Fig. 1 (color online) Schematic view of the experimental setup (a), Typical γ-ray spectra of irradiated Zn sample (b), activities of measured radionuclides with different cooling time (c) and excitation function of the ^{112}Sn(n, x)^{111}In reaction (d).

Therapeutic radionuclides ^{64}Cu and ^{67}Cu can be potentially produced by neutron induced reactions on zinc. Light charged particles produced via neutron induced reactions can lead to material damage of reactor and accelerator. Besides, radioactive nuclei also bring in radiation protection problems for equipment maintenance. Therefore, accurate and precise cross sections of neutron induced reactions on zinc are essential for further development of nuclear technologies.

In this work, cross sections of neutron induced reactions on natural zinc were measured by using the activation technique at 14.0 MeV neutron energy. The neutrons were produced via the $^{3}H(d, n)^{4}He$ reaction. Neutron energy in the irradiation was determined by the cross section ratio of $^{90}Zr(n, 2n)^{89}Zr$ and $^{93}Nb(n, 2n)^{92m}Nb$ reactions[2]. The neutron flux was determined via the $^{93}Nb(n,2n)^{92m}Nb$ and $^{27}Al(n, \alpha)^{24}Na$ reactions. After the irradiation, the activation of zinc target was measured several times with a lead shielded HPGe detector over a period of three months. Then, the activation cross section was determined by using the activation formula. Our experimental data illustrated satisfactory agreement with most of the available literature data. The reliability of evaluated nuclear data from the CENDL-3.2, ENDF/B-VIII.0, JENDL-5, BROND-3.1 and JEFF-3.3 libraries were checked by comparing with experimental data. Besides, these reactions were calculated by using the TALYS-1.95 code with adjusted nuclear model parameters.

References

[1] J. S. Choi, S. C. Park, K. R. Park, et al., Nat. Sci. 05(2013)173.

[2] A. Filatenkov, IAEA, INDC (CCP)-0460, (2016).