

Plasma spraying B₄C-ZrO₂ to prepare moderator decoupling layer for spallation neutron sources

Cadmium and boron carbide(B₄C) are two very excellent neutron decoupling materials, due to the problem of irradiation swelling(increases helium gas), B₄C has not been used as a decoupling material in high-power spallation neutron sources in the world, and cadmium or cadmium composite materials are still the mainstream neutron decoupling materials that have been applied practically. But in fact, B₄C as a neutron decoupling material can get a higher decoupling energy value. In order to actually use B₄C as a neutron decoupling material in the high-power spallation neutron source, J-PARC researchers reported a cadmium-B₄C-cadmium composite structure, cadmium is a pre-decoupler can reduce the helium production of the B₄C. In this paper, another potential decoupling layer preparation method to reduce B₄C swelling is provided, and the decoupling layer is prepared by plasma spraying of B₄C-zirconia, and the pores are added by the spraying process to accommodate the generated helium and avoid material damage.

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Session Classification: Poster