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Fabrication and characterization of Be12V pebbles with different diameters

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Neutron multipliers with lower swelling and higher stability at elevated temperatures are desired for the pebble bed blankets of designed DEMO rector. Among beryllium-based intermetallic alloys, vanadium beryllide Be12V is considered to be an attractive material from the point of view of its potential use as an advanced neutron multiplier of the breeding blanket. Preliminary assessment of its properties showed that, compared to other beryllides, Be12V has a small value of deuterium trapping efficiency and low rate of hydrogen generation by reacting with water vapor.
Rotating electrode method (REM) was applied in this study for fabrication of sphere-shaped Be12V pebbles using a plasma-sintered Be-V electrode. Be-V electrode as raw material played a role of the target which was melted and centrifugally ejected in the form of spherical droplets in the helium-filled atmosphere of REM apparatus. Since the angular rotation speed of Be-V rod is one of the important technological parameters which significantly influences the sizes of produced pebbles, the wide operating range (2000-6000 rpm) was selected by granulation process and produced batches of pebbles were analyzed. The yield properties, sizes and some characteristics of microstructure of fabricated vanadium beryllide pebbles are summarized and discussed in this work.

Co-author: KURINSKIY, Petr (Department of Blanket Systems Research Fusion Energy Research Development Directorate Rokkasho Fusion Institute National Institutes for Quantum and Radiological Science and Technology QST)

Presenter: KURINSKIY, Petr (Department of Blanket Systems Research Fusion Energy Research Development Directorate Rokkasho Fusion Institute National Institutes for Quantum and Radiological Science and Technology QST)

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