

## Status of R&D of advanced neutron multiplier in ITER-BA activity

### (28) Production and characterization of binary-sized Be<sub>12</sub>V pebbles

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Among other beryllides, vanadium beryllide Be<sub>12</sub>V is considered to be one of the most perspective materials for the use as a neutron multiplier of the breeding blanket. Be<sub>12</sub>V pebbles having the diameters of 0.425-0.60 and 2.36-2.80 mm were fabricated using rotating electrode method (REM) and their fusion-relevant properties were studied using different techniques.

**Keywords:** binary pebble packing, vanadium beryllide, granulation, yield

#### 1. Introduction

Single-phase Be<sub>12</sub>V pebbles were successfully fabricated using REM using the plasma-sintered beryllide electrodes in high-purity helium atmosphere. Besides of investigation of microstructure, shape characteristics of produced pebbles and the granulation yield values, several tests on study of pebble bed packing density have been performed.

#### 2. Summary

##### 2-1. Experimental

Be<sub>12</sub>V pebbles were fabricated by centrifugal melting of Be-7.7at.% V rod (electrode) in helium-filled chamber of REM apparatus using the plasma-sintered beryllide electrodes. Variable electrode rotation speeds allowed the fabrication of vanadium beryllide pebbles in the size range of 0.4-3 mm. Different analytical tools and techniques were used by the investigation of microstructural and yield properties of produced samples.

##### 2-2. Pebble Bed Packing Density Experiments

The packing densities of produced single-sized Be<sub>12</sub>V pebbles (2.36-2.80 mm) and binary-sized pebbles (with the addition of 0.425-0.60 mm pebble fraction) in constraint and non-constraint states were investigated by filling of the cylindrical cavities having diameters of 30mm. Figures 1 and 2 represent pebble bed packing experiments using single- and binary-sized Be<sub>12</sub>V pebbles produced at QST. Detailed description of obtained results will be presented and discussed.



Fig. 1 Single-sized Be<sub>12</sub>V pebbles in a cylindrical container

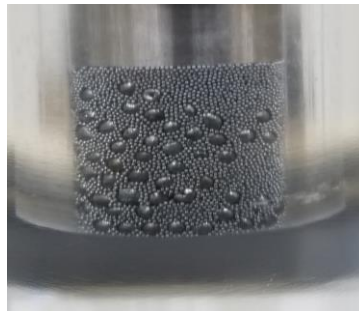


Fig. 2 Pebble bed packing density experiment using binary-sized pebbles