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タングステンへの希ガスおよび水素照射の二体衝突近似シミュレーション

Binary-collision-approximation simulation for noble gas and hydrogen irradiation onto plasma facing materials

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It is better to avoid the nano-structure formation in PFM. To achieve this aim, it is necessary to reveal the mechanism of the nanostructure formation in PFM under helium gas irradiation[1-7]. Intuitively, the nano structure formation is regarded as the phenomenon composed of the invasion of helium gas into PFM[2-4], the difussion of helium in PFM[5,6] and the transformaiotn of PFM material[7] (See Fig. 1).

As the first approach to reveal the structure formation mechanism, we pick up the invasion process of helium into PFM and we developed the binary collision approximation (BCA) simulation. BCA simulation is performed by ACㅓT (atomic collision in any structured target) code[2-4,8]. In BCA simulation, multi-body interactions in a material approximate to consecutive two-body interactions between a projectile atom and the nearest neighbor atom. Using this code, we calculate the penetration depth and sputtering yield which are basic information to reveal the nano-structure formation.

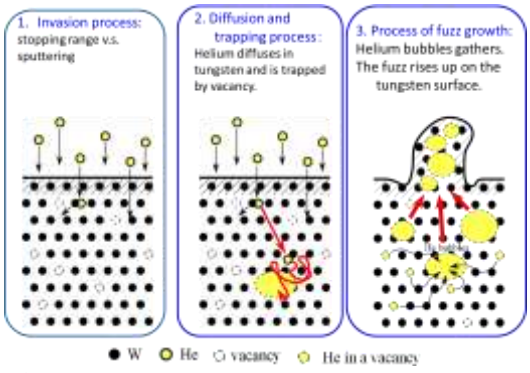
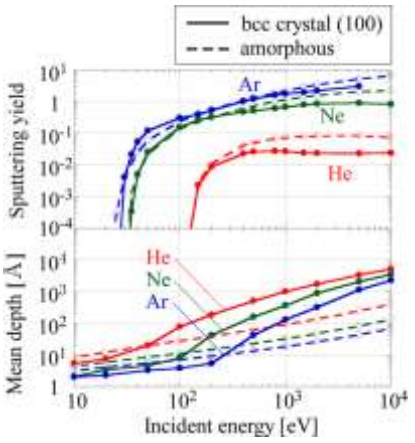


Fig.1 Schematic images of processes of the fuzz structure formation.

BCA simulation is performed by ACㅓT code [2,3]. The scattering angle of the projectile and the recoil atom at each binary collision is obtained analytically in a two-body interatomic potential [4].

We obatined the sputtering yields and mean depth for noblel gasses (He, Ne, Ar) in Fig. 2[8].



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