A quantum dynamic approach to the condensation processes of zinc atoms by the inner-core excitation due to ion-recombination

Masumi Obara, author

Abstrak

Isolated atoms in group II-B such as zinc (Zn), cadmium (Cd), and mercury (Hg) are chemically stable. These atoms are important in the formation of excimer. Zinc in particular has been investigated by many researchers, as Zn2 excimer holds promise because of its long lifetime and its potential as an energy-storage system. However, excimer’s benefits are based on excitation of the outermost electron. Our study confirmed the quantum dynamical condensation processes in which inner-core excitation arises due to ion-recombination between the vapor phase and the solid phase. The X-ray diffraction of the condensed structure of zinc film had included strong diffuse scattering depending on the incident energies. In this research, we produced the excited state of zinc excimer characterized by an extremely long lifetime. Intriguingly, a feature of the zinc film is that it transforms from metallic to insulative. It is thought that such a structure with this characteristic has been affected by electron spin and atomic distortion by inner-core excitation. The structure obtained in our experiment is expected to prove promising in engineering applications, such as electronics, spintronics, and batteries.