

## **Development of Er<sub>2</sub>O<sub>3</sub> coating for hydrogen permeation barrier and electrical insulator through MOCVD process in an advanced breeding blanket**

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Erbium oxide (Er<sub>2</sub>O<sub>3</sub>) was also shown to be a high potential candidate for tritium permeation barrier and electrical insulator coating for liquid breeding blanket system such as liquid Li, Li-Pb or molten-salt blankets. The electrical insulating coating on the interior surface of the wall is an attractive concept for restraining of the Magneto-Hydrodynamic (MHD) pressure drop.

However, most of the previous efforts utilized Physical Vapor Deposition (PVD) coating technologies, which have limited capability in coating on complex surfaces expected in the blanket components. In the present study, we have applied Metal Organic Chemical Vapor Deposition (MOCVD) process for the Er<sub>2</sub>O<sub>3</sub> coating. MOCVD has a vapor phase epitaxy growth technique which is synthesized via vapor phase from metal organic complex and it will be desirable deposition method to form oxide layer on the complicated shape ducts and large-area walls of breeding blanket components.

Recently, we confirmed that Er<sub>2</sub>O<sub>3</sub> coating layers were synthesized on metal vanadium alloy and Si single crystal plates. XRD analysis showed that Er<sub>2</sub>O<sub>3</sub> single phase layer was formed on metal V and Si single crystal substrate at 550°C of substrate temperature. In this paper, the effects of the synthesis conditions, such as temperature and environment, on microstructure, hydrogen permeation and electrical property on Er<sub>2</sub>O<sub>3</sub> coating layer through MOCVD process will be reported.

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