

Development of RF based capacitively-coupled plasma system for deposition of tungsten nano layers on graphite

Wednesday 24 October 2018 08:30 (20 minutes)

Based on the current trends in thermonuclear fusion research, it is quite likely that future fusion machines, DEMO and beyond, will be operating with tungsten and alloys based on tungsten as the plasma facing material on their walls and targets to dissipate the thermal as well as particle loads under extreme conditions. Tungsten is being preferred because of its superior thermo-mechanical properties as well as for its low tritium retention. However, use of pure tungsten as a structural material itself will substantially increase the manufacturing cost and overall system mass and also it is difficult to machine. Hence, tungsten coatings on light substrate such as graphite are preferred which essentially reduce the cost and structural weight considerably. In this article, we report the development of a RF based capacitively coupled plasma reactor for tungsten coating on graphite tiles using plasma assisted chemical vapour deposition at SVITS, India. Tungsten nano layers have been successfully deposited on graphite test pieces by reducing the heavy tungsten hexafluoride gas in hydrogen. Characterization and post analysis of the tungsten coated tiles has been carried out to study the presence of tungsten, thickness of the coating, thermal fatigue etc.

Country or International Organization

India

Paper Number

FIP/P3-57

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Session Classification: P3 Posters

Track Classification: FIP - Fusion Engineering, Integration and Power Plant Design