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Graphene as a Coating for Plasma Facing Components[1] MARCOS NAVARRO, RICHARD ROJAS, GERALD KULCISNKI, MAX LAGALLY, JOHN SANTARIUS, Univ of Wisconsin, Madison — Graphene has been a source of interest for multiple applications because of its unusual electronic and mechanical properties. A number of experimental studies have established that defect-free graphene is an excellent chemical-barrier material, but there have been no reports of graphene proposed as a protective coating against ion and/or neutral interactions with material surfaces. In the presence of such irradiation, plasma facing components (PFC's) tend to develop "fuzz/grass" structures that lead to the sputtering of wall material, diminishing the lifetime of the PFC's and plasma performance. We have shown that graphene can reduce or eliminate changes on surface morphology due to energetic helium. In the case of graphene-covered tungsten, our results show that, compared to the uncovered W, graphene suppresses these morphologies that form on the surface of hot W. Using Raman spectroscopy as a diagnostic, the graphene coating shows little sign of damage after being irradiated, indicating that there is little to no sputtering of carbon impurities from the surface. We have also determined that the mass losses in W have been reduced significantly. Both decreases in impurities can lead to an improved plasma performance and longer lifetimes for PFC's.

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