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Recycling at tungsten wall and its impact on boundary plasma profile XIANZHU TANG, ZEHUA GUO, YING WANG, VALERY BOROVIKOV, ART VOTER, Los Alamos National Laboratory — High-Z refractory metals like tungsten, hydrogen absorbing metal like lithium, and carbon tiles represent three distinct choices in recycling properties. Tungsten divertor/first wall is considered a high recycling boundary, in contrast to the hydrogen absorbing lithium, by the usual definition of returned neutral versus incoming ion flux. Unlike carbon tile which is also high recycling, tungsten wall does not take in the ion heat flux as well in that most ions are reflected back to the plasma, keeping most of their kinetic energy. The inability of plasma ions to efficiently exhaust in particle and energy implies a high temperature boundary plasma. This leads to the peculiar scenario that tungsten wall tends to maintain high edge density like the carbon tiles, but retain a high ion temperature like the lithium surface. This is of course an unstable scenario, which must be resolved by either modifying the recycling at the surface, or exhausting the energy flux by other channels. Our calculations will (1) show the characteristics of particle and energy recycling at the tungsten surface, and (2) illustrate the effect of tungsten wall recycling on boundary plasmas, and the mitigation strategies. The issue of helium ions is a particular focus. *Work supported by OFES*

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