Abstract Submitted
for the DPP14 Meeting of
The American Physical Society

Simulation of tungsten dust impact on ITER-like plasma edge R.D. SMIRNOV, S.I. KRASHENINNIKOV, A.YU. PIGAROV, UCSD, T.D. ROGNLIEN, LLNL — The large stationary or intermittent particle and heat fluxes in future fusion devices, such as ITER, can damage plasma-facing components leading to production of metallic dust and droplets. Transport and ablation of such dust present an important mechanism of impurity contamination of fusion plasmas. We investigate impact of tungsten dust on ITER-like edge plasmas using the DUSTT/UEDGE code. Different scenarios of tungsten dust injection in ITER divertor and upstream plasmas are modeled. It is demonstrated that injection of the dust with rates as low as a few mg/s can already cause unacceptably high relative concentrations of tungsten impurities in the core-edge, which can limit ITER operational regimes to the point of ignition inaccessibility. Larger rates of tungsten dust injection, of order of a few 10mg/s, are shown to lead to divertor plasma thermal instability and discharge termination. It is also found that accumulation of high-Z impurities in plasma edge produces large scale plasma oscillations causing undesirable periodic variations of divertor heat load. Implications of the obtained results on ITER dust production limits are discussed.

Roman Smirnov
UCSD

Date submitted: 10 Jul 2014 Electronic form version 1.4