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Investigation of Plasma Surface Interactions with the PISCES ELM Laser System K.R. UMSTADTER, M. BALDWIN, J. HANNA, R. DOERNER, T. LYNCH, T. PALMER, G.R. TYNAN, UCSD — When an ELM occurs in tokamaks, up to 30% of the pedestal energy can be deposited on the wall of the tokamak causing heating & material loss due to sublimation, evaporation and melt splashing of plasma facing components (PFCs) and expansion of the ejected material into the plasma. We have explored heat pulses using an electrical power circuit to draw electrons from the plasma to heat samples ohmically. This system is limited in power to $\sim$250kJ/m^2 at the minimum pulse width of 10ms and depletes the plasma column, complicating spectroscopy. We have completed calculations that indicate that a pulsed laser system can be used to simulate the heat pulse of ELMs. We are integrating laser systems into the existing PFC research program in PISCES, a laboratory facility capable of reproducing plasma-materials interactions expected during normal operation of large tokamaks. Two Nd:YAG lasers capable of delivering up to 50J of energy over various pulsewidths are used for the experiments. Laser heat pulse only, H+/D+ plasma only, and laser+plasma experiments were conducted and initial results indicate that metals behave very differently while exposed to plasma and simultaneous heat pulses. We will also discuss initial results for carbon PFCs and material transport into the plasma. Supported by US DoE grant DE-FG02-07ER-54912.

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