

# Effect of LBO-seeded Impurity on ELMs in the HL-2A tokamak

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Effect of the pedestal deposited impurity on the edge-localized mode (ELM) behaviour has been observed and intensively investigated in the HL-2A tokamak. Impurities have been externally seeded by a newly developed laser blow-off (LBO) system. Both mitigation and suppression of ELMs have been realized by LBO-seeded impurity. Measurements have shown that the LBO-seeded impurity particles are mainly deposited in the pedestal region. During the ELM mitigation phase, the pedestal density fluctuation is significantly increased, indicating that the ELM mitigation may be achieved by the enhancement of the pedestal transport. The transition from ELM mitigation to ELM suppression was triggered when the number of the LBO-seeded impurity exceeds a threshold value. During the ELM suppression phase, a harmonic coherent mode (HCM) is excited by the LBO-seeded impurity, and the pedestal density fluctuation is significantly decreased, the electron density is continuously increased, implying that HCM may reduce the pedestal turbulence, suppress ELMs, increase the pedestal pressure, thus extending the Peeling-Ballooning instability limit. It has been found that the occurrence of the ELM mitigation and ELM suppression closely depends on the LBO laser spot diameter.

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