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Recent results of Li experiments in EAST with W divertor

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In EAST, Li applications with various methods have been systemically developed and significantly improve plasma performance, such as Li evaporation for suppressing impurity radiation and reducing hydrogen recycling [1], Li dropper for 18s ELM-suppressed H-mode discharges [2], Li granule injection for ELM pacing [3], and flowing liquid Li limiter (FLiLi) for improved performance plasma and reduced divertor heat flux [4]. Recently in 2016, Li applications were successfully carried out in EAST in upper-single null configuration using the ITER-like W divertor, and new, exciting results were obtained. A uniform Li coating using new dedicated ovens effectively suppressed W impurities coming into the plasma. Reproducible high performance ELM-eliminated H-mode discharges with high power RF heating have been obtained in the EAST W divertor tokamak, resulting from the continuous real-time injection of a fine Li aerosol into the plasma upper X-point. Moreover, no core impurity accumulation was observed during ELM-free periods. We note that real-time Li aerosol injection appears to promote the growth of the low-n electromagnetic coherent mode (MCM), possibly owing to the increase in Li concentration. Robust ELM pacing with Li granules injection was demonstrated in upper-single null W PFC discharges. It was also observed Li granules injection shifted the density profile outward, then change the characters of edge fluctuation. During 2016 Flowing Liquid Lithium (FLiLi) limiter experiments, some engineering significant improvement were realized, including improvement of liquid Li surface coverage uniformity (˜80%), without no obvious limiter surface damage and no Li passive bursts. Moreover, improved plasma performance during transient ELM-free H-modes, with a strong increase of WMHD and H98 were demonstrated, along with full-field ohmic H-mode. Overall, the Li coating provided an excellent wall conditioning in W divertor, facilitating the 62s EAST H-mode. Those new results of Li applications with W PFCs wall in EAST would significantly extend the Li potential applications in future reactors.
Reference
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Eligible for student paper award?

No

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