Contribution ID: **254** Type: **Poster**

Suppression of tungsten impurity by lithium injection in tungsten divertor on EAST

Monday, 5 June 2017 13:40 (2 hours)

EAST has upgraded the upper graphite divertor to ITER-like W/Cu monoblock structure[1] with active water cooling in order to facilitate the high power and long pulse plasmas[2]. Without wall conditioning tungsten impurity accumulation has been usually observed in plasmas, which is a crucial impediment to achieving high power, long-pulse H-modes. Therefore, some wall conditioning technologies need be explored to suppress the tungsten impurity, such as lithium (Li) aerosol injection[3] and Li coating[4]. In 2016, plasma discharges are performed in tungsten (W) upper divertor, and some exciting results are obtained with Li aerosol injection.
The Li evaporation system in EAST has been upgraded with three new ovens located in the horizontal D, J, O port on EAST, separated toroidally by 120 deg.. The new ovens have three apertures for Li evaporation, for improving the Li coverage uniformity. In addition, there are two lithium powder dropper systems mounted in the J upper port: one located above the upper X-point, the other one located radially outboard between the X-point and outer midplane. The amount of injected lithium aerosol is controlled by a resonating piezoelectric disk.
The uniform Li coating with the new ovens effectively suppressed W impurity influx coming from W divertor to avoid impurity accumulation in the plasma core. Overall the Li coating provided an excellent wall conditioning for high performance plasmas on the W divertor, facilitating a 62s long H-mode. The real-time Li aerosol injection suppressed tungsten accumulation; plasma stored energy and confinement increased both in L- and H-mode. In addition the strength of the tungsten source decreased with the Li injection rate. Also, the inner target ion saturation current and electron temperature decreased at the inner target. Even after termination of Li aerosol injection, the core W intensity remained at a low level.
These results are encouraging as a possible mechanism to control tungsten impurities in future fusion devices.

Reference
1. D. M. Yao et al., Fusion Eng. Des. 98-99 (2015) 1692
2. B.N. Wan et al., Nucl. Fusion 55(2015)104015
3. J.S. Hu et al., Phys.Rev. Letts. 114 (2015) 155001
4. G.Z. Zuo et al., Plasma Phys. Contr. Fusion 54 (2012) 0115014

Eligible for student paper award?

Yes

Author: XU, Wei (Institute of Plasma Physics)

Co-authors: Dr DIALLO, Ahmed (Princeton University Plasma Physics Laboratory Princeton); Mr MANSFIELD, Dennis (Princeton University Plasma Physics Laboratory Princeton); Dr ZUO, G.Z. (Institue of Plasma Physics, Chinese Academy of Sciences); Prof. HU, Jiansheng (Institute of Plasma Physics, Chinese Academy of Sciences); Dr TRITZ, Kevin (Johns Hopkins University); Dr MAINGI, Rajesh (Princeton University Plasma Physics Laboratory Princeton); Dr LUNSFORD, Robert (Princeton University Plasma Physics Laboratory Princeton); Dr OSBORNE, T. (General Atomics,); Dr SUN, Zhen (ASIPP)

Presenter: XU, Wei (Institute of Plasma Physics)

Session Classification: M.POS: Poster Session M

Track Classification: Plasma-material interactions, plasma edge physics