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P2.1100 Deuterium retention in liquid Sn samples exposed to D2 plasmas of GyM

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Divertor plates of tokamaks are known to be subjected to extremely high heat loads. Melting, cracking and other damages of Plasma Facing Components (PFCs) may occur [1]. Experiments in tokamaks after severe melting of tungsten (W) tiles in the divertor demonstrated that such damage events could compromise the reliable machine operation. Liquid Metals (LMs) present many potential advantages when compared to solid tungsten PFCs. Both laboratory experiments replacing tokamak environment and tokamak experiments themselves [2] have already shown that LMs can be a viable solution as PFCs. Tin (Sn) is one of the most promising candidates [3] to be used as a liquid metal PFC due to its low evaporation rate and melting point. In order to qualify Sn as a PFC, a fundamental aspect that needs to be carefully investigated is how much deuterium is retained in liquid Sn under fusion conditions. While some tests devoted to evaluate the heat load handling capability of liquid Sn systems were done [4], data on deuterium retention of Sn when exposed to a D_2 plasma are still very few [5]. In this contribution, we present a systematic investigation of deuterium retention in liquid Sn (at a temperature of 600 K) exposed to the D2 plasma of the linear machine GyM [6], as a function of plasma fluence. The typical deuterium ion fluxes of GyM are 10^(19)-10^(20) m^(-2)s^(-1) at an electron temperature of 5-10 eV. Free liquid Sn targets were exposed (horizontal exposure) for plasma fluence in the range of 1-4 x10^(24) m^(-2). Ex-situ analysis by Nuclear Reaction Analysis (NRA) on Sn after exposure has proved that the amount of atomic deuterium retained is very low, in the range of 0.1-0.2 at %, a retention value lower than that reported for W [7]. Furthermore, the study carried out as a function of fluence shows that deuterium retention does not increase for the investigated experimental parameters.

[1] J.W. Coenen et al., Presentation at the 20th PSI Conference, Aachen, Germany (2012)
[2] F. L. TabarÈs et al., Plasma Phys. Control. Fusion 58 (2016) 014014
[3] A. Cremona et al., Nuclear Materials and Energy 17 (2018) 253-258
[4] T.W. Morgan, et al., Plasma Phys. Control. Fusion 60, 014025 (2018)
[5] J.P.S. Loureiro et al., Nuclear Materials and Energy 12 (2017) 709
[6] D. Ricci et al., Proc. of the 39th EPS Conference, Stockholm, Sweden, ECA, vol. 36F (2012)
[7] T. Tanabe 2014 Phys. Scr. 2014 014044

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