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Impact of He admixture on the ammonia formation in N_2 seeded D_2 plasmas in the GyM facility

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Impurity seeding with nitrogen is routinely used to reduce the power load to divertor target plates by radiation in front of the target plates as demonstrate in JET-ILW and AUG [1]. As a side product of the use of nitrogen as metallic plasma-facing surface, ammonia in significant amounts can develop. The ammonia formation is a critical issue because, being ammonia hazardous, could have a significant implication on the operation of the ITER tritium plant which is prepared to process titrated ammonia in small amounts. In this context, it is important to try and identify means to reduce/prevent ammonia formation during experiments with nitrogen seeding in present day devices. In N_2 seeded D_2 plasmas, ammonia formation proceeds on the surface of the wall by adsorption of the ND radicals produced by ion-molecules reactions in low temperature plasmas [2]. Taking into account the mechanism before mentioned, helium has been identified as the species that could reduce the ammonia formation because it can potential occupy surface trapping sites in the metallic surface at which surface reactions leading to ammonia formation take place. The effects on the ammonia formation of the helium admixture to N_2 seeded D_2 plasmas were evaluated in GyM linear device [3]. ND_3 produced during the experiments was monitored by optical emission spectroscopy, through observation of the ND emission band. Ammonia quantification was obtained by operations involving the collection of the exhaust in LN_2 trap and liquid ion chromatography (LIC) analysis [5]. Results by LIC reveal a decrease in ND_3 formation proportional to the increase of the He ion flux.

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