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Dynamics of the formation and loss of boron atoms in a H_2/B_2H_6 microwave plasma C. Y. DULUARD, X. AUBERT, LSPM, CNRS, Université Paris 13, 99 av J.-B. Clément, 93430 Villetaneuse, France, N. SADEGHI, LIPhy (UMR5588) LTM (UMR5129), Université de Grenoble CNRS, Grenoble, France, A. GICQUEL, LSPM, CNRS, Université Paris 13, 99 av J.-B. Clément, 93430 Villetaneuse, France — For further improvements in doped-diamond deposition technology, an understanding of the complex chemistry in $H_2/CH_4/B_2H_6$ plasmas is of general importance. In this context, a H_2/B_2H_6 plasma ignited by microwave power in a near resonant cavity at high pressure (100-200 mbar) is studied to measure the B-atom density in the ground state. The discharge is ignited in the gas mixture (0-135 ppm B_2H_6 in H_2) by a 2.45 GHz microwave generator, leading to the formation of a hemispheric plasma core, surrounded by a faint discharge halo filling the remaining reactor volume. Measurements with both laser induced fluorescence and resonant absoption with a boron hollow cathode lamp indicate that the B-atom density is higher in the halo than in the plasma core. When the absorption line-of-sight is positioned in the halo, the absorption is so strong that the upper detection limit is reached. To understand the mechanisms of creation and loss of boron atoms, time-resolved absorption measurements have been carried out in a pulsed plasma regime (10 Hz, duty cycle 50 %). The study focuses on the influence of the total pressure, the partial pressure of B_2H_6, as well as the source power, on the growth and decay rates of boron atoms when the plasma is turned off.

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