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Characterisation of a He/O_2/HMDSO microplasma jet by molecular beam mass spectrometry DIRK ELLERWEG, RUEDIGER REUTER, JAN BENEDIKT, ACHIM VON KEUDELL, Research Group Reactive Plasmas, Ruhr-University Bochum, Germany — A microscale atmospheric pressure plasma jet with parallel-plate rf-driven electrodes at 1mm separation is used to deposit thin organic SiO_xC_y and anorganic SiO_x films on silicon substrates. This is done by admixing a small amount (<0.01%) of hexamethyldisiloxane (HMDSO) or HMDSO/O_2 to the He flow (5slm) of the microplasma jet. However, the HMDSO plasma chemistry at atmospheric pressure is not well-understood. Therefore a molecular beam mass spectrometer (MBMS) is used to get an insight into the HMDSO and HMDSO/O_2 plasma chemistry, respectively. An HMDSO depletion up to 6% can be measured without O_2 addition and several stable reaction products are identified. This condition leads to organic films. The resulting film quality improves when O_2 is added to the He/HMDSO flow. The MBMS measurements revealed that thereby the HMDSO depletion doubles and the densities of the main reaction products increase significantly, too. Additionally, polymerisation products larger than HMDSO appear. These MBMS measurements help to understand the HMDSO plasma chemistry at atmospheric pressure and can help to determine the reaction mechanism leading to anorganic SiO_2 film growth.

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