Abstract Submitted
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How much water we have in silane-oxygen plasma during SiO2 deposition in HDP-PECVD reactor PAVEL BULKIN, TATIANA NOVIKOVA, DMITRI DAINEKA, ROELENE BOTHA[1], LPICM, Ecole polytechnique, Palaiseau 91128 France — Deposition of SiO2 from silane and oxygen plasma is an integral part of microelectronics technology. While extensively studied and published about, the process is however still not completely understood. In our work we discuss the importance of such reaction by-product as water. We show that H2O is the major component of deposition atmosphere, despite being ignored in many studies. Analysis of pressure changes dynamics, study of the gas composition using QMS and OES and films analysis by spectroscopic ellipsometry and transmission spectroscopy suggest that the water produced in the deposition can account for considerable part of molecular flux onto the wafer surface. Using controlled nonuniformity of silane delivery by injecting SiH4 through capillary and comparing the spatial variations of material quality with case of uniform injection through gas ring we suggest new explanation for OH incorporation into SiO2 film during the growth. Data are corroborated by DSMC gas flow modeling using phenomenological approach for description of surface reactions.

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