

P4.3016 Self-consistent simulation of hydrogen-methane plasmas for growth of carbon materials

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See full abstract here:

<http://ocs.ciemat.es/EPS2019ABS/pdf/P4.3016.pdf>

MW assisted hydrogen methane plasmas have been extensively used for growth of CVD diamond and graphene. In this article, we discuss the results of self-consistent simulation of hydrogen-methane plasmas in a microwave resonating cavity over wide range of operating conditions (25-200mbar) and different concentrations of methane. Details of the self-consistent model is provided elsewhere [1]. The results indicate that the pressure, power and concentration of methane in the H₂-CH₄ methane affect the characteristics of the coupling between MW and plasma. Figure 1 shows the atomic hydrogen concentration and microwave power density at a pressure of 110 mbar and power 1250 W. It is seen that the addition of methane increases the temperature of the reactor. As a result the the dissociation of hydrogen increases with addition of methane. Addition of small amounts of methane can change the characteristics of the MW-plasma interaction and is a function of pressure and precursor gases. More results with regard to different operating conditions will be presented. These results are important in the context of growth of carbon based materials.

References

[1] S. Prasanna et al. Plasma Sources Science and Technology 26.9 (2017)

Presenter: HASSOUNI, K. (EPS 2019)

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