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Modelling and simulation of Cl₂ plasma and mixtures: application to the material etching

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Cl₂ plasma has been widely used to perform etching of different materials. Nowadays, it serves as an etchant for silicon, III-V compounds or metals (Co, Fe, Ni). Recently, Atomic Layer Etching of noble metals was studied. Plasma mixtures shows a great interest to perform these processes. In this study, we have developed a plasma kinetic model using a global approach for a complex chemistry Cl₂/(O₂-N₂-BCl₃)/Ar. This approach helps to understand evolution of electrical parameters such as electronic density and temperature and ion densities. Due to high importance of sputtering in etching processes, these data have great importance to estimate the evolution of the etched surface exposed to the plasma. Otherwise, the analyze of the neutral reactive species such as Cl and O leads to know more about the chemical etching of metals in comparison to the physical sputtering by ion bombardment. Indeed, formation of volatile compounds onto the surface is a major point to perform plasma etching with high etching rate. In some cases, formation of surface sites by adsorption of Cl atoms is not sufficient. Adsorption of atomic oxygen would activate the chemical desorption by creating volatile species. However, because of the lack of some data concerning the plasma kinetic as the reaction kinetic coefficients, and surface parameters as the loss probability coefficients on the surface of reactive neutral species, their estimation requires the comparisons with experimental results.

Choix de session parallèle

2.2 Plasmas froids: Diagnostics, Procédés et Applications

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