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Consideration of Target Platen Materials in Plasma Immersion Ion Implantation

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In plasma immersion ion implantation (PIII), ions are accelerated from the polymerized plasma by applying a negative voltage to the sample stage. Hence, ions impinge into not only the sample but also the exposed area of the sample planer. In most cases, the exposed sample planer area is larger than that of the sample (e.g., a silicon wafer) and constitutes the majority of the power deposition. Our theoretical simulation reveals that, in typical PIII conditions, over 70% of the ions bombard the side and bottom of the sample planer. The materials that make up the sample planer surface thus have a critical influence on the secondary electron emission, sample heating, and amount of sputtered contaminants. The secondary electrons affect the electrical efficiency, design of the modulator, as well as a ray production and the subsequent protector. Sputtering of the target platen releases metallic and other ions into the plasma that can contaminate the samples. The choice of a compatible material thus critical in processes such as SPIMAX (sputter plasma implantation of oxygen). The target platen heat capacity affects the sample temperature that is critical in elevated-temperature or near-temperature processes such as high-frequency, low-voltage PIII and hydrogen PIII/ICP. In this paper, we present results acquired from theoretical and experimental investigations on the target materials selection and the influence on the treatment results.

Stationary and Non-Stationary Discharge at Atmospheric Pressure in Pin-Plate System and Its Application for Nonequilibrium Plasma Chemistry

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In this report we considered the following problems:

- Theoretical studies of stationary and non-stationary discharge at atmospheric pressure in "pin-plate" system;
- Numerical simulation of physical processes in "pin-plate" system;
- Experimental investigations of atmospheric plasma discharge;
- Development of ecological pure technologies for:
  - ozone generation;
  - flame and exhaust gases cleaning;
  - natural gas protecting.