

Abstract

METHODS FOR USING ISOTOPICALLY ENRICHED LEVELS OF DOPANT GAS COMPOSITIONS IN AN ION IMPLANTATION PROCESS

A novel process for using enriched and highly enriched dopant gases is provided herein that eliminates the problems currently encountered by end-users from being able to realize the process benefits associated with ion implanting such dopant gases. For a given flow rate within a prescribed range, operating at a reduced total power level of the ion source is designed to reduce the ionization efficiency of the enriched dopant gas compared to that of its corresponding non-enriched or lesser enriched dopant gas. The temperature of the source filament is also reduced, thereby mitigating the adverse effects of fluorine etching and ion source shorting when a fluorine-containing enriched dopant gas is utilized. The reduced levels of total power in combination with a lower ionization efficiency and lower ion source temperature can interact synergistically to improve and extend ion source life, while beneficially maintaining a beam current that does not unacceptably deviate from previously qualified levels.

Figure 1