

**BORON-CONTAINING DOPANT COMPOSITIONS, SYSTEMS AND
METHODS OF USE THEREOF FOR IMPROVING ION BEAM
CURRENT AND PERFORMANCE DURING BORON ION
IMPLANTATION**

Abstract

A novel composition, system and method for improving beam current during boron ion implantation are provided. In a preferred aspect, the boron ion implant process involves utilizing B₂H₆, 11BF₃ and H₂ at specific ranges of concentrations. The B₂H₆ is selected to have an ionization cross-section higher than that of the BF₃ at an operating arc voltage of an ion source utilized during generation and implantation of active hydrogen ions species. The hydrogen allows higher levels of B₂H₆ to be introduced into the BF₃ without reduction in F ion scavenging. The active boron ions produce an improved beam current characterized by maintaining or increasing the beam current level without incurring degradation of the ion source when compared to a beam current generated from conventional boron precursor materials.

Fig. 1