

Hydrogen in carbonaceous materials studied by SIMS

Seung Hee Kim, T. H. Kim, J. W. Lee, and C. Y. Kim

LG Electronics Research Center, Analytical Technologies Lab.,

16 Woomyeon-Dong, Seocho-Gu, Seoul, 137-140 Korea

It is well known that secondary ion yield is very sensitive to the matrix change under the reactive ion bombardment. Matrix effect is a general term used to describe differences in sensitivity for a given element in samples of different composition. A large number of studies have been made on the matrix effect in semiconductor, metal, and metal-alloy systems. However, little attention has been given to the carbonaceous materials.

In this work, we have studied the change of the hydrogen ion yield in diamond like carbon (DLC) films as a function of the hydrogen content and in several polymers such as polyethylene (PE), polypropylene (PP), polyisoprene (PIP), and polystyrene (PS). The negative secondary ion yield of hydrogen and carbon was measured by PHI 6300 Secondary Ion Mass Spectrometry (SIMS) system using 5kV Cs⁺ primary ion beam. In case of polymers, the ratio of the secondary ion yield Y_{H^-}/Y_{C^-} is reduced against the hydrogen content. There is a inverse linearity between the ratio of the secondary ion yield Y_{H^-}/Y_{C^-} and the hydrogen content of the polymers. Similar results have been found in the diamond like carbon (DLC) films. Further studies of the matrix effect and the emission mechanism of carbonaceous materials in SIMS analysis will be presented.