

Ionization Probability of Atoms Sputtered From Solid Surfaces : Diffusion Effect.

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Abstract

The diffusion effect through out sputtering process has been investigated using probability rate equation which is modulated by adding an extra concerning the density function. Our results make sure that the charge exchange process is confirmed by increasing the atomic level half width, lowering the atomic energy level position and decreasing the sputtered ion velocity in spite of increasing the hole life time.

Introduction

Sputtering, i.e the ejection of atoms under ion bombardment of solid surfaces, is a complex phenomenon which in many aspects is still an unsolved challenge to the sputtering community [1,2]. One of the fundamental problems in the sputtering theory is the anomalies in Yu's [3] data of O sputtered from vanadium and niobium surfaces which stimulated the interest of many theoretical efforts.

All these efforts account for the low velocity discrepancy by introducing :
1- the dependence of the velocity of the ejected practical on the distance to the surface [4].

2- the effect of electron diffusion in solids on the sputtering process [5,6]
We shall theoretically investigate the influence of the electron scattering process on the ionization of the sputtered ions. Since electron scattering processes influence the time - space evolution of electronic perturbations in solids and thus may also influence the charge state formation process.