

The Significance of the Particle Initial Charge State in Sputtering Process

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ABSTRACT: The charge exchange between a sputtering atom (ion) and solid surface is studied in this paper. So for this purpose the semiclassical probability rate equation is considered to calculate the neutralization probability through out the electron tunneling model. The results and conclusions are presented and extendedly to show the whole general features of the sputtering process and the role of the particle initial charge state in it.

1. INTRODUCTION

When an atom (or ion) is within the interaction region with a metal surface, its electronics levels couple with those of the metal. This results in an energy shift and broadening of the atomic level. The broadening may allow for a charge transfer process between the atom and the surface. These charge transfers processes play an important role in atomic surface interactions that determine the charge state of the particles scattered or sputtered from a surface. In the standard description of the charge transfer process [1-14], the charge transfer rate is given by the width of the atomic level broadening and the direction of the transfer is determine by an energy criterion .

The term "sputtering" comprises an indication of the microscopic nature of a sputtering event which may define as the emission of atomic particles from surface under energetic particle bombardment . Sputtering has to be a useful tool in surface science , since the observations of the sputtered particles give conclusions on the composition of the sputtered surface . The sputtered particles