An indirect technique to measure the work function of mono and polycrystalline solid surfaces

M. C. A. Nono, R. A. Vieira, and S. L. Mineiro

Laboratório Associado de Sensores e Materiais, Instituto Nacional de Pesquisas Espaciais
Caixa Postal 515, 12201-970, São José dos Campos, SP, Brazil

The work function of metals is actually very sensitive to the microscopic structure of the surface, i.e. the crystallographic orientation and the structural and chemical perfectness and such a valuable quantity for the additional characterization of virgin and modified surfaces. These values are very important to design interfaces between the film and substrate in adherence improvement studies. There are several direct and indirect methods to measure the work function of a solid surface. The work function can be directely measured by observing the emission of electrons from the surface. Photoeletric and thermionic emissions of electrons are the two primary methods of electrons emission. However, accurate measurements are difficult for the direct methods and the work function of a material is usually determined indirectly. Indirect measurement is accomplished by two methods exposure of a surface to an external beam of electrons and measuring the contact potential difference between the sample and a reference electrode. The contact potential difference method is known as Kelvin method. In this work is shown a simple method that use of the balance between surface tension and gravitational forces to determine the work function. The work function was determined for several of mono solid surfaces of semiconductor materials and the results shown a difference less than 10% when compared to literature data. Work function for several materials and surface roughness also determined.

The authors would like to thank MCT, FAPESP, and CNPq for financial support.