

Theoretical Analysis of Photoassisted Field Emission near the Metal Surface Using Transfer Hamiltonian Method

Authors : Rosangliana Chawngthu, Ramkumar K. Thapa

Abstract : A model calculation of photoassisted field emission current (PFEC) by using transfer Hamiltonian method will be present here. When the photon energy is incident on the surface of the metals, such that the energy of a photon is usually less than the work function of the metal under investigation. The incident radiation photo excites the electrons to a final state which lies below the vacuum level; the electrons are confined within the metal surface. A strong static electric field is then applied to the surface of the metal which causes the photoexcited electrons to tunnel through the surface potential barrier into the vacuum region and constitutes the considerable current called photoassisted field emission current. The incident radiation is usually a laser beam, causes the transition of electrons from the initial state to the final state and the matrix element for this transition will be written. For the calculation of PFEC, transfer Hamiltonian method is used. The initial state wavefunction is calculated by using Kronig-Penney potential model. The effect of the matrix element will also be studied. An appropriate dielectric model for the surface region of the metal will be used for the evaluation of vector potential. FORTRAN programme is used for the calculation of PFEC. The results will be checked with experimental data and the theoretical results.

Keywords : photoassisted field emission, transfer Hamiltonian, vector potential, wavefunction

Conference Title : ICMTPS 2018 : International Conference on Mathematics and Theoretical Physical Sciences

Conference Location : Singapore, Singapore

Conference Dates : May 03-04, 2018