"The Electrical Contact Resistance of Two Rough Surfaces with Varying Phase Conductivity"

A three-dimensional computer model with combined current and contact area calculating abilities was developed to explore the effects of non-conductive phase on the electrical contact resistance of nano-composite thin films. The model results showed how the composite resistivity was affected at a critical non-conductive phase called the percolation threshold. The resulting knowledge of contact area size and spatial distribution enabled calculation of adhesion and temperature distribution in and around the contact. Experimental verification of the model was performed with a modified nano-indentation apparatus on thin films created via pulsed-laser deposition. The usefulness of the modeling approach pertaining to generalized electrical contacts will be discussed.