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Tunneling percolation behavior and filling factors in metal-insulator nanocomposites RUPAM MUKHERJEE, ZHI-FENG HUANG, BORIS NADGORNY, Wayne State University — We have studied conventional transport and tunneling in nanocomposite metal-insulator systems. Two types of percolation thresholds P_C^1 and P_C^2, associated with both conventional transport and quantum tunneling respectively are identified in the same nanocomposite systems and the functional dependence between the two thresholds is investigated. In addition, we have studied the relationship between filling factors and percolation thresholds, particularly the importance of geometric effects of nanoparticles of different sizes and shapes in metal-insulator composite systems. A non-monotonic dependence of filling factor as a function of filler volume fraction is established and possible implications of this non-trivial behavior is discussed.

Rupam Mukherjee
Wayne State University

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