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Percolation behavior in metallic-insulator composite systems and the filling factor near the percolation threshold RUPAM MUKHERJEE, DEBABRATA MISHRA, ZHIFENG HUANG, BORIS NADGORNYY, Wayne State University — We investigate the percolation behavior in various composite metal – insulator systems including LiCoO₂/ CrO₂, MgB₂/Al₂O₃, CrO₂/Al₂O₃, CrO₂/CaCO₃. The effect of particle size and shapes in these systems has been studied to better understand the geometrical phase transitions. The power law exponent around the percolation threshold has been found to be 2.0 ± 0.04 in all the cases, which agrees well with the theoretical result. Interestingly, the filling factor of these composite systems also exhibits the power law dependence near the percolation threshold with the value found to be dependent on the shape of the insulating particle. The exponent ranges from 0.2 to 0.4 depending on size of particles of a given shape in the composite system.

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