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Janne Peltonen, Matti Murtomaa, Kelly Robinson, Jarno Salonen

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The electrical resistivity and relative permittivity of binary powder mixtures

Janne Peltonen^{a,*}, Matti Murtomaa^a, Kelly Robinson^b, Jarno Salonen^a

^a*Department of Physics and Astronomy, University of Turku, 20014 Turku, Finland*

^b*Electrostatic Answers, LLC., 15 Piping Rock Run, Rochester, NY 14450, USA*

Abstract

Effective electrical resistivities and static relative permittivities of binary powder mixtures were measured and compared to theoretical equations given by Generalized Mixture Rule (GMR). The measured values for mixtures were influenced by the resistivity and permittivity of the pure component materials, the particle sizes and by the sticking between the different particles. According to the Random Model (RM), the effective resistivity and relative permittivity of any randomly packed mixture material can be calculated from the component resistivities and relative permittivities, respectively, and their concentrations. It was shown that RM gave good predictions for both quantities for powders if the particle sizes of the component materials were almost the same. However, this was not the case when large NaCl particles were mixed with fine sugar particles. When these mixtures were prepared, finer, more numerous sugar particles coated the larger NaCl particles, and the mixtures were not random but closer to the series configuration. Effect of particle size was studied briefly by mixing very fine NaCl particles with

*Corresponding author. Tel.: +358 2 333 5694

Email address: janne.m.peltonen@utu.fi (Janne Peltonen)

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