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Resistivity of thin gold films on mica induced by electron-surface scattering from a self-affine fractal surface[1] RAUL C. MUNOZ, CLAUDIO GONZALEZ-FUENTES, RICARDO HENRIQUEZ, MARCOS FLORES, Department of Physics, University of Chile — We present a rigorous comparison between resistivity data and theoretical predictions involving the theory of Palasantzas [G. Palasantzas et al., *Phys. Rev.* **B 56** 7726 (1997)], and the mSXW-fractal theory [R. C. Munoz et al., *Phys. Rev.* **B 66** 205401 (2002)], regarding the resistivity arising from electron scattering by a self affine fractal surface on gold films *using no adjustable parameters*. We find that both theories lead to an approximate description of the temperature dependence of the resistivity data. However, the description of charge transport based upon fractal scaling seems oversimplified, and the predicted increase in resistivity arising from electron-surface scattering seems at variance with other experimental results. If the samples are made up of grains such that the mean grain diameter D > L(300), the electronic mean free path in the bulk at 300 K, then the predicted increase in resistivity at 4 K is of the order of a few percent. This contradicts published measurements of magnetomorphic effects arising from size effects where *electron-surface scattering is the dominant electron scattering mechanism at 4 K* . On the contrary, if the samples are made out of grains such that D < L(300), then *the dominant electron scattering mechanism controlling the resistivity is not electron-surface scattering but rather electron-grain boundary scattering, and the latter electron scattering mechanism is not included in either theory.*

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