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**Optical Response of Graded Films** JOSEPH T.A. KWOK, K.W. YU,

The Chinese University of Hong Kong — Graded materials have quite different physical properties from the homogeneous materials. Recently, it has been found that graded thin films may have better dielectric properties than a single-layer film. The materials properties of graded films can vary continuously in space. These materials have attracted much interest in various engineering applications. However, the traditional theories fail to deal with the composites of graded inclusions. Recently, for treating these composites, we presented a first-principles approach [1] and differential effective dipole approximation [2]. In this work, we adopt a graded multilayer model by putting together infinite planes of square lattices. We adopted the Drude dielectric gradation profile for the polarizability of the spherical metallic particles. An external electric field is applied to the multilayer and the local field inside the multilayer has been calculated by Lekner summation method [3]. The effect of the boundary condition has also been examined. From this, the effective polarizability and hence the optical absorption as well as optical nonlinearity of the film can be obtained. Such theoretical studies on the dielectric properties of graded composite materials will be useful in diverse applications. [1]. L. Dong, G. Q. Gu, and K. W. Yu, Phys. Rev. B 67, 224205 (2003). [2]. J. P. Huang, K. W. Yu, G. Q. Gu, and M. Karttunen, Phys. Rev. E 67, 051405 (2003). [3]. S. V. Lishchuk, Mol. Phys. 100, 3789 (2002).

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