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A unified conductivity expression for Ohmic and space-charge conduction in solid dielectrics

Ho-Kei Chan
University of Nottingham, UK

A unified conductivity expression for Ohmic and space-charge conduction in solid dielectrics will be presented. The expression is based on the mass-action relation that describes the generation-recombination processes of p-type and n-type charge carriers. The overall conductivity is counter-intuitively not an algebraic sum of the Ohmic conductivity and the conductivity of space-charge-limited conduction, but it is rather a nonlinear function of the two, and also a function of the mobility difference between p-type and n-type carriers. The analytic expression is consistent with the individual cases of either Ohmic or space-charge-limited conduction, and it yields results that are consistent with an experimentally observed phenomenon of polarization offsets in compositionally graded ferroelectric materials.

Biography

Ho-Kei Chan has developed a method of sequential deposition for constructing the densest possible cylindrical packings of equal-sized spheres. Chan obtained a 1ˢᵗ class degree in Engineering Physics (2002) from the Hong Kong Polytechnic University and a PhD in Nonlinear and Liquid Crystal Physics (2007) from the University of Manchester, followed by post-doctoral research in Hong Kong, Ireland and England. He has published in various areas of soft matter physics and physical chemistry.

epkeiyeah@yahoo.com.hk

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