

Characterization of Particles with off-Centered Cores by Light Scattering

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The optical characteristics of a cluster consisting of zinc sulfide (ZnS) particles doped with a nonconcentric spherical copper (CU) cores illuminated with an arbitrarily focused Gaussian beam are presented. The presented aggregations of nonconcentric doped particles (i.e. core with offset origin) form linear chains or densely packed clusters. The laser beam is modeled using angular spectrum of plane waves method and then combined with the cluster *T*-matrix method which is modified to solve such difficult multiple scattering problem. This combination provides a powerful mathematical technique to obtain the phase (scattering) matrix of a cluster illuminated with any incident electromagnetic fields. The scattering matrix provides complete descriptions of the scattering characteristics in the far field zone. The computed results are shown for different beam waist with respect to the cluster. The scattering processes and its results help understanding many cluster characteristics and nonlinear processes. The presented numerical results show that the elements of the scattering matrix are sensitive to the focusing of the incident beam and characteristics of the cluster constituents. The illustrated results are important for researches aim to improve polymer properties and to study several branches of practical sciences and industries such as nanotechnology, pharmaceuticals, chemistry, and biology.

This paper represents the first attempt to study the multiple scattering from a cluster of nonspherical particles with nonconcentric spherical cores illuminated by an arbitrarily focused laser beam.

Biography:

Dr. Elsayed Esam M. Khaled is currently a mature professor in Electrical Engineering Department, Engineering Faculty, Assiut University. He received B.Sc. And M.Sc. Degrees from Elec. Eng. Depat, Assiut University in 1976 and 1982 respectively. In 1985 to 1987 he was a research assistant at Concordia University, Montreal, Canada where he pursued some Graduate courses at McGill and Concordia Universities. He received his Ph.D degree from Clarkson University, New York, USA in 1992. He worked as an Assistant professor in Sultanate of Oman from 1998 to 2004. He was a Vice Dean for students affairs, Engineering Faculty, Sohag University in 2008 - 2012 and Vice Dean for community services and environment affairs in 2008 – 2009. He was the Dean for the same Faculty in 2012 - 2014. His publications are around 85 in international journals and conferences. His research interests are Laser scattering by particles and clusters, Microwave propagation and scattering, Antennas designs in different bands, Light wave and micro- nano-electronic devices.