

## Functional nanocomposites based on silicon carbide nanoparticles: Selected insights on electronic and optical features

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Nanostructured materials based on the wide band gap semi-conductors Silicon Carbide (SiC) nanoparticles as isolated objects, embedded in polymer matrixes or functionalized by thin layer (~2 nm) of conducting polymers were realized. The physical properties of several nanomaterials and nanocomposites were investigated including electrical, dielectric, optical and electro-optical features. As isolated nano-objects, SiC nanoparticles exhibit modulated dielectric functions dependant on the particle sizes, on their surface states and on the involved crystalline order. The Electro-optical properties are marked by enhanced Pockels parameters due to polymer-nanoparticle interfaces effects. Alternatively, bare SiC nanoparticles under suitable annealing or hybrid core-shell functionalization of the nanoparticle surfaces are marked by enhanced electrical conductivities of the network associated to good thermo-mechanical behavior. The physical origin of the dielectric and electrical conductivity in these nanomaterials is discussed based on the Havriliak-Negami model and the dynamics of polarons in the hybrid nanocomposites.

### Biography

Abdel Hadi Kassiba graduated from Caen University (Ph.D. - French CNRS award in 1986) in Physics of Matter and Radiation and Habilitation from Maine University in Le Mans (France). He is a Senior Researcher in the Institute of Le Mans Molecules and Materials (IMMM) affiliated to the French National Centre of Scientific Research CNRS (UMR-6283). His main research interests are in the areas devoted to physics of nanomaterials, nanocomposites for electronics, nonlinear optics and electrooptics, functional mesoscopic materials for optical applications of wide band gap semiconductors such as silicon carbide and titanium dioxide. He is author and co-author of about 100 scientific contributions with major peer review articles and refereed proceedings of conference, contributions in 3 books and gives about 20 invited international conferences, 30 oral presentations and seminars in international conferences and ensure several chairman sessions in international conferences (Morocco, Poland, Tunisia, Romania, France, Mexico, China); supervisor of the works of 30 master and Ph.D. students. He was awarded Best Scientific Paper in Nanotechnologies and advanced Materials "Arab Science and technologies fondation" (SRO5- Fès Morocco 2008), Best invited conference talk (ICHMS Yalta 2009), Title of "Chevalier" of Palmes Academiques 2010 (Ministry of National Education - France), Title of Honorary Professor in Czestochowa-University Poland 2010 and Nominated as "Senior International Researcher" by China Academy of Science (CAS) 2011 for scientific cooperation with Shanghai institute of Ceramics (SIC-CAS), Invited International researcher in CINVESTAV Mexico 2012.

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