Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Multimetal plasmonic nanomaterials for solar energy harvesting[1]

RAMKI KALYANARAMAN, JUSTIN TRICE, Dept. of Physics, Washington University in St. Louis, RADHAKRISHNA SURESHKUMAR, Energy, Environmental and Chemical Engineering, Washington University in St. Louis , HERNANDO GARCIA, Dept. of Physics, Southern Illinois University in Edwardsville — Efficient broadband solar absorbing coatings could significantly enhance the performance of Si solar cells. Here, we present the design of novel SiO_2-based nanomaterial coatings based on multimetal plasmonic absorption. By implementing an efficient homogenization procedure based on the tight lower bounds of the Bergman-Milton formulation [Garcia et al. Phys. Rev. B, 75, 045439 (2007)], we have predicted the absorption coefficient of a quaternary nanocomposite consisting of Cu, Ag, and Au nanospheres embedded in a SiO_2 host matrix. A simulated annealing algorithm was used to predict nanocomposite properties (particle size and volume fractions) which result in a broadband absorption (350 - 800 nm) that matches the shape of the solar emission. These results show that novel optical materials can be made from multimetal-dielectric nanocomposites.

[1]R.K. and R.S. acknowledge support by the National Science Foundation through CAREER Grant No. DMI-0449258 and No. CTS-0335348, respectively.

Ramki Kalyanaraman
Dept. of Physics, Washington University in St. Louis

Date submitted: 04 Dec 2007 Electronic form version 1.4