Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Novel solid-state nuclear detectors based on defect-free crystalline α-HgI_2 nanowires synthesized at diffusion controlled conditions[1]
EDGAR MOSQUERA-VARGAS[2], RAJASEKARAKUMAR VADAPOO, University of Puerto Rico-Rio Piedras, CARLOS MARIN, University of Puerto Rico-Mayaguez — Solid-state detectors are based on semiconductors materials that directly convert X-Ray or Gamma-Ray photons in hole-electron pair with sufficient mobility to produce electric current. HgI_2 is a very large band-gap semiconductor material able to operate at room-temperature (RT) under ideal conditions provide by perfect crystallinity. Crystals of α-HgI_2 were proposed as the perfect detector material due to its large seminsulating band-gap and large stopping power. Although HgI_2 crystals of good quality and large size have been grown, their commercial use is reduced because the crystalline quality degrades during the processes for fabrication of devices. Trapping defects are created and no fabrication method has been found to circumvent the problem in a systematic and reproducible manner. Based on our capability to synthesized defect-free crystalline HgI_2 nanoneedles inside porous matrix we are proposing to fabricate detectors that will not require manipulation of the HgI_2 crystals and, therefore, will not suffer degradation and the associated lack of performance. Fundamental understanding, control and application for the fabrication of these detectors will be studied in the context of preparation and synthesis of HgI_2 nanostructures in the porous matrix.

[1]NSF-EPSCoR IFN (Grant 0701525)
[2]Institute for Functional Nanomaterials

Edgar Mosquera-Vargas
University of Puerto Rico

Date submitted: 28 Oct 2009 Electronic form version 1.4