Abstract Submitted
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Monochromatic X-Ray Irradiation of High-Z Atoms and Nanoparticles for Biomedical Applications SARA LIM, A. PRADHAN, S. NAHAR, E. CHOWDHURY, Ohio State U, Y. YU, K. HUANG, K. YAN, Thomas Jefferson U — We will report theoeretical and experimental studies of resonant X-ray interaction with heavy elements for potential applications to cancer diagnsotics and therapy. The resonant transitions may be targeted with monochromatic X-ray sources, such as synchrotron photon beams and high-intensity pulsed lasers [1] following a deep inner-shell ionization. X-rays from conventional machines in medical use are broadband with filtered bremsstrahlung spectrum. This is very ineffcient as low-energy X-rays are absorbed without much penetration and high-energy x-rays pass through without much interaction. Calculations of Auger cascades and K-shell resonance positions [2] show that monochromatic beams may be employed to optimize localized energy deposition in high-Z nanomaterials embedded, e.g. in a cancerous tumor. Theoretical results for several elements from bromine (Z = 35) to gold (Z = 79) and experimental studies for partial conversion of bremsstrahlung spectrum from conventional X-ray sources into K-alpha radiation for imaging and/or therapeutics will be reported.

[1] Pradhan et al., J. Phys. Chem. A 113, 12356 (2009);
[2] Nahar et al. Can. J. Phys. (in press)- Partial Support: DOE

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