Abstract Submitted
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Pumping K_α Resonance Fluorescence by Monochromatic X-Ray Sources[1] ANIL PRADHAN, SULTANA NAHAR, The Ohio State University — We demonstrate the correspondence between theoretically calculated K-shell resonances lying below the K-edge in multiple ionization states of an element[2] (Pradhan et al 2009), and recently observed K_α resonances in high-intensity X-ray free-electron laser (XFEL) plasmas[3] (Vinko et al 2012). Resonant absorptions due to K_α transitions in aluminum ions are computed and found to reproduce experimentally observed fluorescence features. Calculated fluorescence features for titanium are presented for possible observation of K_α resonances in the 4.5-5.0 keV energy range. A possibly sustainable excitation mechanism for K_α resonance fluorescence might be implemented using two monochromatic X-ray beams tuned to the K-edge and the K_α resonant energies simultaneously. This targeted ionization/excitation would create inner-shell vacancies via Auger decay, as well as pump K_α resonances. The required X-ray fluence to achieve resonance fluorescence would evidently be much less than in the XFEL experiments, and might enable novel biomedical applications.

[1]DOE, NSF
[2]A. K. Pradhan, S. S. N. Nahar, et al, J. Phys. Chem. A **113**, 12356 (2009).
[3]S. M. Vinko et al, Nature **482**, 59 (2012).

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