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Measurement of heavy ion induced X-ray production cross sections in metallic targets at MeV energies.

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Experimental X-Ray production cross sections (i.e. probability of X-ray generation in a target by an incoming MeV heavy ion beam) are useful not just for fundamental ion beam-matter interaction studies,but also for the development of new ion beam materials analysis techniques such as the Heavy Ion Particle Induced X-Ray Emission (HI-PIXE) spectroscopy. Unfortunately, while theoretical predictions of X-ray production cross sections due to light (Z <6) projectile ions are generally in good agreement with experiment, this is not the same for heavier projectiles. There is therefore need for substantial experimental data to improve theoretical models. This presentation describes measurements carried out to determine X-ray production cross sections in zirconium (Zr), Tin (Sn) and Vanadium (V) metal oxide films due to carbon and chlorine MeV ion beams. The measured cross sections are compared to predictions by the modified Plane Wave Born Approximation (PWBA) and the ECPSSR theory that takes into account the energy loss and coulomb deflection of the projectile and the pertubed-stationary state and relativistic nature of the target's inner shell. The observed agreements and discrepancies between experiment and theory are discussed in terms of the atomic ionization mechanisms for each projectile-target collision.

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