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Electron impact induced light emission from zinc atoms

DANICA CVEJANOVIC, University of Western Australia

Experimental studies of electron impact excitation of zinc atom are rare, primarily due to experimental difficulties. However, zinc is an interesting target because of possible applications in light sources. Also, due to its position in periodic table, zinc is an interesting case for the fundamental understanding of momentum couplings and the role of electron correlations in complex metal atoms. Recent experimental investigations have indicated the existence of highly correlated scattering mechanisms via formation of negative ion resonances and Post Collision Interaction (PCI) in the decay of autoionizing states. These can significantly modify energy dependence of the emission cross sections at low impact energies and the studies of photon emission offer a sensitive way to investigate electron correlations. Specifically, in the lowest autoionizing region of zinc, i.e. between 10 and 15 eV, both the cross sections and polarization of emitted light are affected by the formation of short lived negative ions and PCI effects. These are associated with excitation of one of the sub-valence 3d electrons and complex correlations between inner 3d and outer excited electrons in the target and also with the slow electron released into continuum, need to be included in modeling. Also the scattering of the spin polarized electrons has shown significant spin effects when excitation proceeds via negative ion resonances. Emission cross sections and comparison with theory would be discussed at the conference.