SCALING RULES OF ELECTRON CAPTURE CROSS SECTIONS FOR SLOW LOW-*q* IONS ON GASEOUS TARGETS

Alex M. Imai[a], A. Itoh[a,b]

[a]Department of Nuclear Engineering, Kyoto University, Nishikyo, Kyoto 615-8540, Japan
[b]Quantum Science and Engineering Center, Kyoto University, Uji, Kyoto 611-0011, Japan

Scaling rules for single-, double-, and many-fold-electron capture cross sections for slow high-charge-state (high-*q*) ions are well established [1,2], in which the collision systems likely to become exothermic, but are not the case for slow low-*q* ions, where some collision systems may become endothermic. We have been devoted to producing single- and double-electron-capture cross sections for slow (~20 keV) low-*q* ions on gaseous targets [3-7], projectile ions of which range from low-Z ions of Be, B, C to high-Z ions such as Fe, Ni, and W. A scaling attempt has been made for single-electron capture cross sections of these slow low-*q* ions colliding with atomic and molecular gas targets, utilizing ΔIP, the first ionization potential of the target subtracted by that of the projectile ion after electron capture [7]. Dash-dotted line in the Figure 1 denotes derived scaling formula for the exo- (ΔIP < 0) and endothermic (ΔIP > 0) collisions, respectively, which reproduced the measured cross sections within –1.36 to +0.64 order(s) of magnitude. Yet another formula will be presented in the conference.

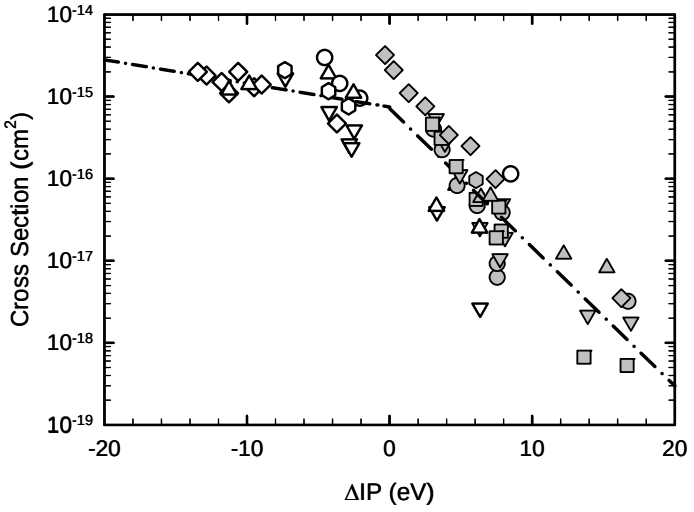

Figure 1: Single-electron-capture cross section scaling for slow low-*q* ions.

References

[1] A. Mueller and E. Salzborn, Phys. Lett. A, 62, 391 (1977).

[2] T. Kusakabe et al., J. Phys. B, 19, 2165 (1986).

[3] A. Itoh et al., J. Phys. Soc. Jpn., 64, 3255 (1995).

[4] M. Imai et al., J. Plasma Fusion Res. Ser., 7, 323 (2006).

[5] M. V. Khoma et al., Chem. Phys., 352, 142 (2008).

[6] I. Yu. Tolstikhina et al., J. Phys. B, 45, 145201 (2012).

[7] M. Imai et al., Fusion Sci. Tech., 63, 392 (2013).