Electron-CO excitation cross sections for plasma modelling

A. Laricchiuta, L.D. Pietanza, M. Capitelli, G. Colonna

PLASMI Lab NANOTEC CNR Bari (Italy)

The plasma activation of CO_2 in different plasma regimes is nowadays attracting large interest in the scientific community, representing a promising new-concept technology for the conversion of anthropogenic CO_2 emissions. The non-equilibrium conditions met in plasmas could, in fact, selectively promote reactive channels leading to efficient dissociation and, in turn, to the formation of CO. The detailed description of the vibrational and electronic state kinetics within the state-to-state approach can considerably contribute to the understanding of the collisional mechanisms that critically determines the conversion efficiency [1, 2, 3, 4]. The electron-impact induced dissociative and non-dissociative excitations for dipole-allowed transitions in CO molecule are here reconsidered in the framework of the *similarity approach* [5] for the derivation of vibrationally-specific dynamical data. In Fig. 1 the $(X^1\Sigma^+, v'') \rightarrow (A^1\Pi, v')$ cross sections, obtained optimizing the similarity function parameters for the total excitation cross section from the $v''=0$ level, are compared with experimental and theoretical results [6, 7]. The effect of non-adiabatic vibronic coupling in the excitations to the $B^1\Sigma^+$-$D'^1\Sigma^+$ Rydberg-valence complex, is also investigated.

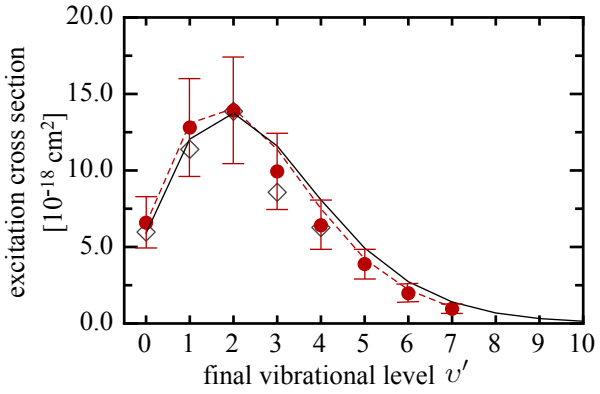

Figure 1: *Cross sections for* $(X^1\Sigma^+, v''=0) \rightarrow (A^1\Pi, v')$ *excitations in e-CO collisions (solid line) at E=30 eV, compared with experiments (close circles) [6] (open diamonds) [7] and BEf theoretical results (dashed line) [6].*

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