

Stellar photons can extract electrons from interstellar dust grains by the photo-electric effect. The ejected electrons carry a fraction of the excess energy in the form of kinetic energy. Thermalization of these fast electrons with gas particles results in net gas-heating. This process, referred to as gas photo-electric heating by dust, has been recognized for nearly a century as the main heating mechanism of diffuse gas in galaxies. In this short review, I will present the current knowledge we have of this process and recent advances that have been made thanks to laboratory measurements and quantum chemical calculations. I will also discuss the importance to include state of the art description of the photo-electric heating to improve astrophysical codes developed for e.g. the diffuse interstellar medium, photodissociation regions, the evaporating surfaces of protoplanetary disks, and star-forming galaxies in the local and distant universe.