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Dependence of plasmon-induced hot-carrier properties on nanoparticle size, material and environment.[1] STEFANO DAL FORNO, JOHANNES LISCHNER, Imperial College London — Plasmon-induced hot electron processes in metallic nanostructures are currently intensely investigated because of their potential for technological applications in photocatalysis, photodetection and solar energy harvesting. An accurate theoretical description of these phenomena is required to guide experimental progress and device design, but developing such a theory is challenging because of the need to combine a description of their optical properties with a theory of their electronic structure. To address this challenge, we employ a two-step procedure proposed by Manjavacas et al.[1]: after solving Maxwells equations for the optical properties of the spherical nanoparticle, we determine hot-electron generation rates by evaluating Fermis golden rule within a jellium approximation. We use this approach to compute hot carrier properties in different materials (Li, Na, K, Al, Cu, Ag, Au) and study their dependence on nanoparticle size and the dielectric constant of the environment. [1] A. Manjavacas, J. G. Liu, V. Kulkarni, and P. Nordlander, ACS Nano 8, 7630 (2014), pMID: 24960573, http://dx.doi.org/10.1021/nn502445f

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