Thesis Defense in Chemistry

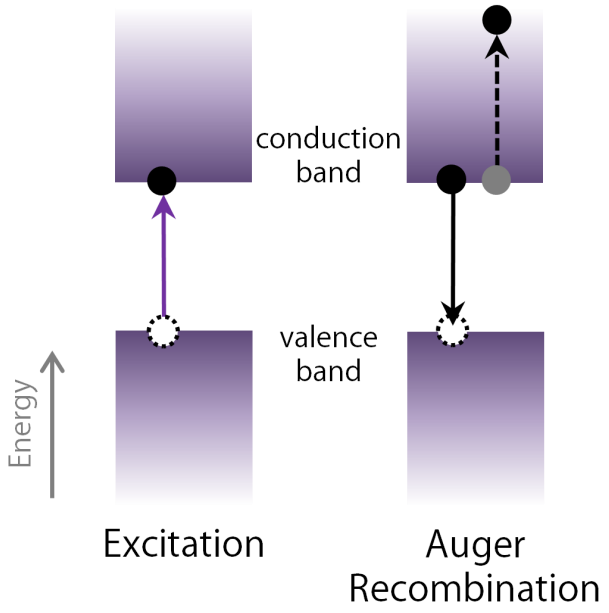
Friday, March 24, 2017 at 2:00pm

Room 209 Havemeyer

Auger recombination in III-V semiconductors

Presented by Kristopher Williams (XYZ Group)

The non-radiative recombination of electron-hole pairs is inherently detrimental to optoelectronic technologies. Unfortunately, it can readily occur in semiconductors when the energy and momentum of the recombination process is conserved through transfer to a third carrier in a process known as Auger recombination. It is believed the Auger recombination process is responsible for the decrease in efficiency of InGaN quantum well LEDs at high carrier densities—a phenomenon known as efficiency droop. We use time-resolved photoemission spectroscopy to directly probe the dynamics of excited electron populations in an InGaN quantum well heterostructure to quantify the importance of Auger recombination in the droop process. Additionally, we exploit the unique band structure of GaSb in order to understand the effects of phonons, inter-valley scattering, and carrier energy on Auger dynamics to reconcile large discrepancies in reported Auger rates and explore potential avenues for reducing losses from this non-radiative process.



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