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GaN: The Role of Be Impurity

GaN and associated alloys are the materials used to make the revolutionary ‘white light’ LEDs and LED-based traffic lights. Less well known is that GaN has potential application in high frequency high power electronics, such as that necessary to drive an automobile engine. The success of the LED’s and realization of power electronics depends on the properties several different impurities. Unfortunately, the structure and chemistry of GaN is much more complicated than that of the world’s premier electronic material, Si, so the basic physics of the impurities is not easily understood. The talk will describe our efforts, using electron paramagnetic resonance (EPR) spectroscopy, to understand these entities, focusing on the ‘ionization energy’ of Be, an impurity incorporated to advance white-light lasers and high power electronics. The method of photo-induced EPR and associated charge transfer analysis will be described. Then, the charge trapping parameters and energy levels extracted from the measurements will be compared with those obtained from optical measurements and the theory of the Be impurity in GaN.

Wednesday, October 12, 2016  
2:00-3:15  
BEC 354