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## Photovoltaic Materials and Device Characterization System

### **Abstract:**

The development of next generation inorganic, organic and hybrid photovoltaic materials is predicted on our ability to understand the processing/structure/optical-electronic property relationships of any new materials. Currently the NCM, the NERCF and the CNFM provide outstanding state of the art facilities for structural (XRD, SEM, TEM, EDX, AFM, FIB, and soon XPS) and optical (UV-VIS-NIR spectrophotometry, RAMAN scattering and ellipsometry) characterization. However, we are lacking equivalent facilities for electronic characterization, which is a critical component in photovoltaic materials development and research. In view of this, we are proposing to acquire a state of the art capacitance-voltage measurement system, along with an ultra-high resistivity measurement system that when combined with existing facilities will permit detailed measurements of photovoltaic material properties that include carrier lifetime, resistivity, photo current-voltage response, solar cell efficiency, leakage current, turn on voltage, and contact resistance. In addition, it should be pointed out that electronic properties are often intimately related to mechanical and compositional properties, thus the facilities can impact research over a broad range of areas.