

Increasing the Photostability of Light-Emitting Materials using Photonic Nanostructures

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Project Summary

High-efficiency organic light-emitting devices (OLEDs), require the use of phosphorescent materials that exhibit high electroluminescence efficiencies. However, there are stability problems with these materials which significantly limit the operational lifetime of high- efficiency blue emitting OLEDs. Essential issues that prevent realization of high stabilities are: (1) excited state quenching; and (2) low light extraction efficiencies associated with device architectures.

This project will use metallic and dielectric nanoparticles that support resonant optical modes to accelerate the emission of phosphorescent materials. In doing so, this approach is expected to increase the photostability of the phosphorescent materials by minimizing excited state quenching.

Applicant GPA and other requirement(s): N/A

Applicant responsibilities: The student will assess the environmental and economic impacts of incorporating nanomaterials into organic solar cells using life-cycle assessment and life-cycle costing methodologies. These methodologies will be based upon ISO (International Organization for Standardization) standards and supporting literature for carrying out life-cycle assessments. To carry out the assessment the student will create a life-cycle inventory using online databases and software. The goal is to understand if the use of nanomaterials for improving solar cells efficiency is justified both environmentally and economically.