

Theme : OLED Materials

Subject : Phosphorescence-free Emitting Materials for OLEDs

Introduction

The goal of this research project is to explore novel organic (or organometallic) materials, which can harvest singlet excitons (internal FLQE > 0.5) for the application of OLED devices. The new-type singlet harvesting materials, in which triplet excitons can be converted into singlet excitons by any means, should have good thermal stabilities, low evaporating nature, and low molecular weight no larger than 1100 electrical for serving as vacuum thermally deposition source.

In case of the novel organic materials, we expect the purified powder of materials to go beyond the existing commercialized products based on the bulk materials.

Scope

Challenges of harvesting singlet excitons and overall efficiency and operating lifetime of OLED devices include:

- Methods to harvesting the singlet excitons (internal FLQE > 0.5).
- Study of target materials with n and p-type, or bipolar, respectively.
- Methods to increase the thermal properties of the target materials such as T_g and T_{ev}.

Research questions

We are interested in the following research questions. These questions are not exhaustive but different research questions are open to discuss with research partners.

- What would be strong candidate materials for harvesting singlet excitons with high device performance?
- What would be the most effective design of organic or organometallic materials for harvesting singlet excitons?
- Is it possible to achieve or overcome the general performance of conventional phosphorescent emitting materials?

Expected Deliverables

The following is open to discussion:

- Suggestion of advanced materials with new structure and/or composition.
- Detailed progress reports every 3 months summarizing accomplishments.
- Prototype powder samples
- Journal publications and patents with SAIT