



Synthesis and Application of Azaporphyrins

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Intellectual Property Status

Patent Pending

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Background

The unique optical properties exhibited by organic compounds with delocalized conjugated pi-electrons make these compounds ideal for fabricating a wide variety of optical and electro-optical devices. Moreover, the process for fabricating these materials into devices is relatively easy. Consequently, these factors have stimulated significant research into the integration of these materials into optical and electro-optical devices.

Still, despite substantial advances, researchers have yet to fully optimize devices employing these compounds. Specifically, problems persist physically among many of the organic materials currently used in optical and electro-optical devices. For example, many of the organic compounds used in these devices are difficult to synthesize. Likewise, other materials fail to provide optimal emissive or absorptive efficiency. Meanwhile still, other materials demonstrate less than ideal stability.

Invention Description

Researchers at Arizona State University have developed a class of pi-conjugated azaporphyrins that significantly improves the emissive and absorptive efficiency in optical and electro-optical devices. Specifically, these azaporphyrins integrate the advantages of both the phthalocyanine (strong absorption in the visible range) and the porphyrin (highly emissive) analogues currently used in optical and electro-optical devices into a single material. The ability to function efficiently both as an absorber and an emitter opens up these azaporphyrins to use in a much broader range of applications.

Potential Applications

- **Optical and Electro-Optical Devices** (Absorbers/Emitters)
 - light emitting diodes
 - organic thin solar cells
 - dye-sensitized solar cells
 - organic concentrators
 - solar hydrogen generation.

Benefits and Advantages

- **Improves Absorptive and Emissive Efficiency** – provides strong absorption in the visible range while also providing high emissivity
- **Integrates Absorbability and Emissivity into a Single Device** – sheds material mass and volume requirements, thereby, also reducing costs of productions and operation; allows a broader range of uses through integration of both functions into a single device