

Boranil-Integrated Polymeric Systems: Solvent-Independent Optical Sensors with Enhanced Photophysical Properties

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Abstract

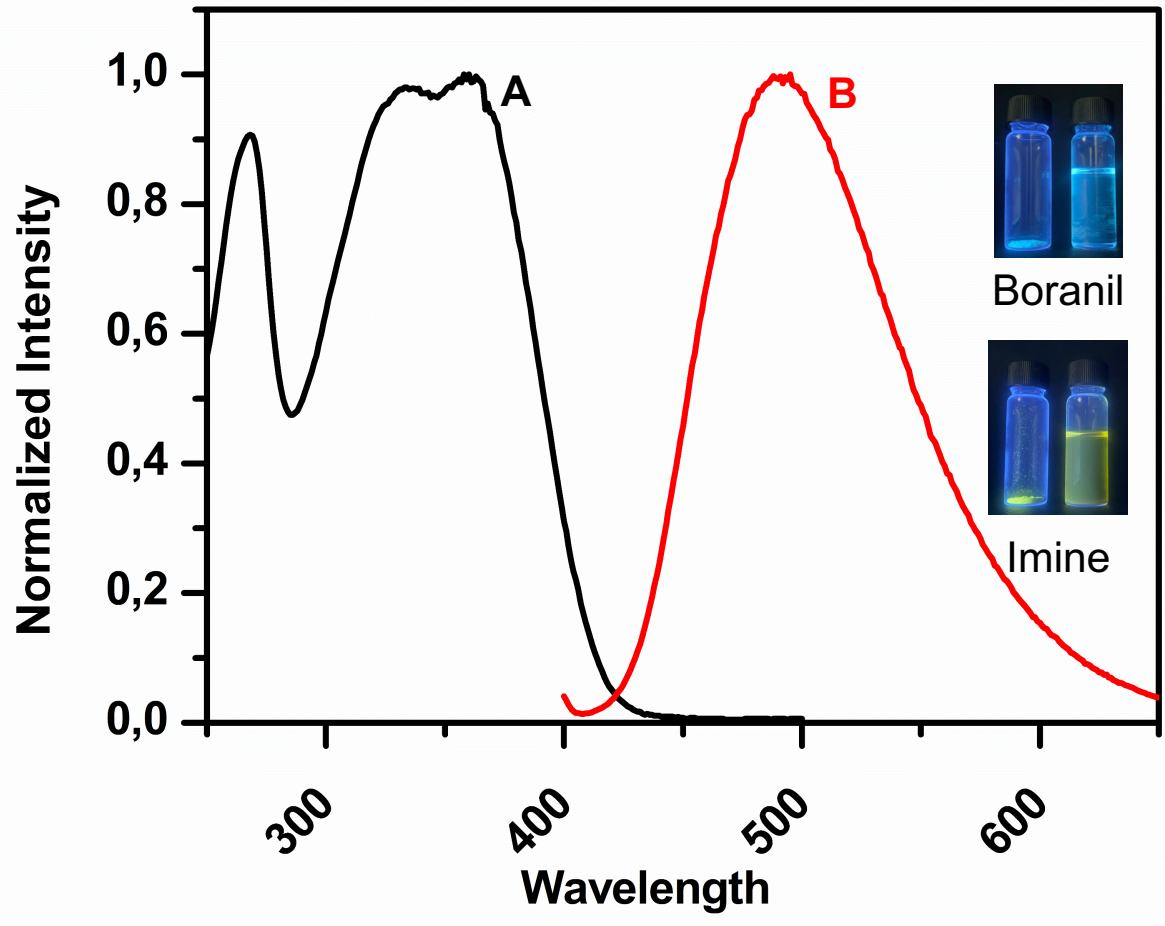
Boranil derivatives possess high fluorescence efficiency, large Stokes shifts, and solid-state emission properties, making them ideal candidates for optical sensing and photonic applications [1]. However, conventional small molecules often face solubility and stability issues in solvent-based systems, limiting their practical use. In this study, boranil compounds were structurally modified by replacing BF₂ groups with formyl functionalities to enhance their photophysical behavior [2,3]. These modified molecules were then covalently incorporated into amine-functionalized poly(VFA-co-EGDMA) microspheres via imine linkage formation [4]. The resulting hybrid materials exhibit solvent-independent optical response and high sensitivity, showing great potential for biosensing and light-emitting technologies.

Importance of Boranil-based Fluorescent Systems

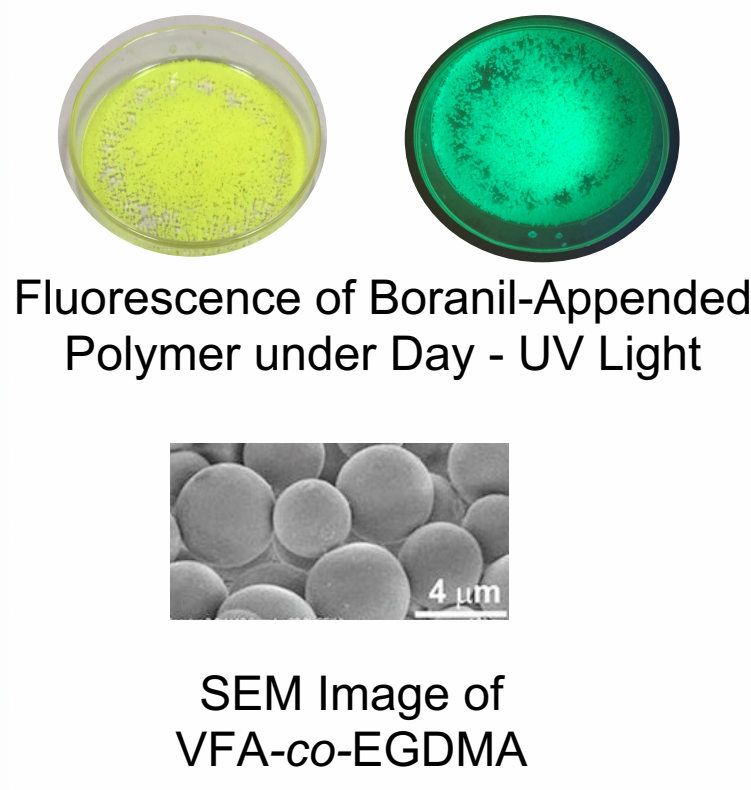
- Strong emission, low band gap, high Stokes shift
- Applications in OLEDs, lasers, sensors
- Solid-state stability and solvent-independence advantages



Photophysical and Morphological Analysis

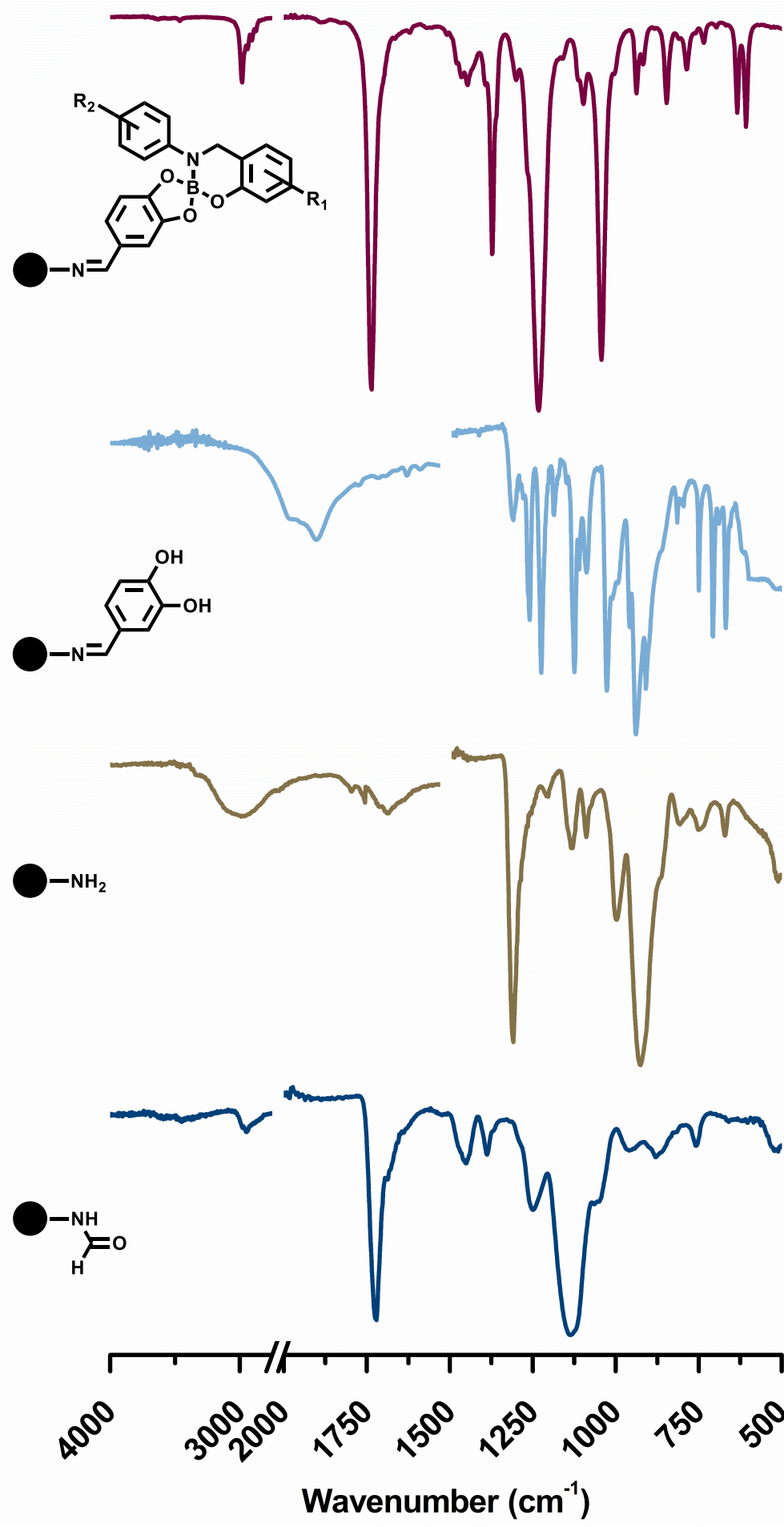


A: UV-Vis Spectrum of Boranil Compound
B: Fluorescence Spectrum of Boranil Compound

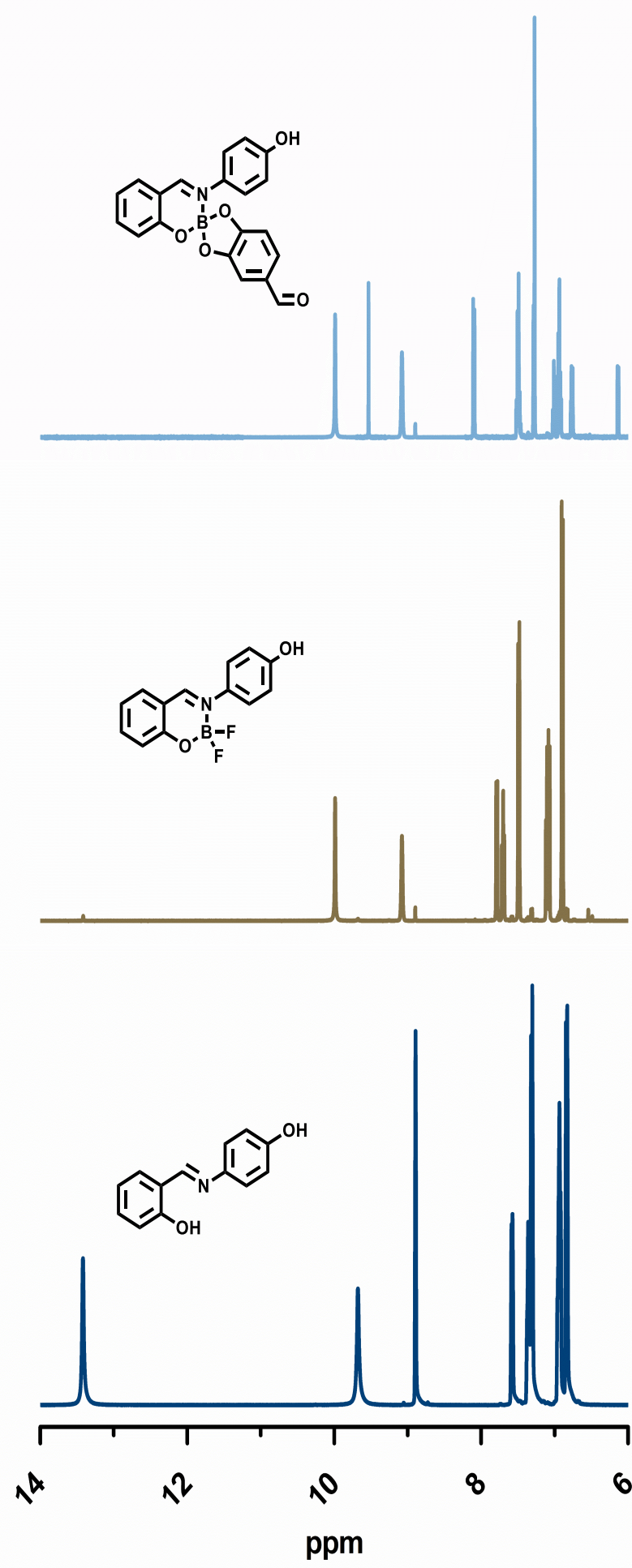


Structural Characterization

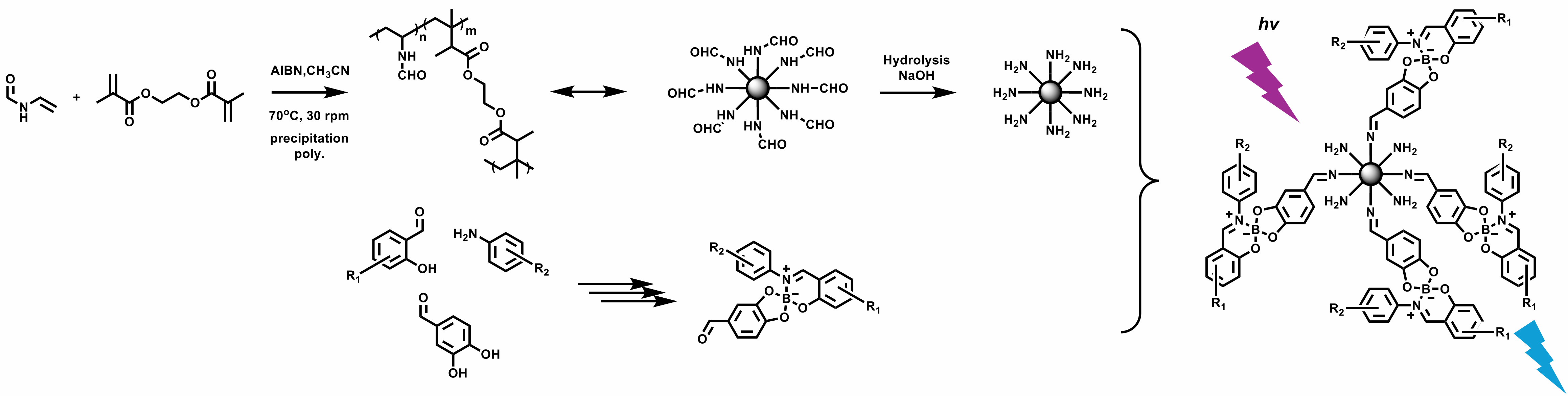
FT-IR Spectral Analysis



NMR Spectral Data



Design and Modification Strategy



Conclusion & Outlook

- Boranil-based polymeric systems show great potential for optical sensing
- Stable, efficient, and environmentally robust sensors
- Boranil-functionalized polymeric microspheres exhibited uniform spherical morphology (SEM) and solvent-independent strong fluorescence. Their tunable surface and photostability make them promising for optical sensing, metal ion detection, and integration into solid-state devices.

Acknowledgment

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References

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