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Conjugated Poly-Metalla-Ynes for Opto-Electronic Applications

ABSTRACT

Conjugated polymers are an exciting class of materials with wide-ranging opto-electronic (O-E) applications. Among them, poly(aryleneethynylene)s (PAEs) are valued for their extended π -conjugation and structural rigidity. However, their luminescence is typically limited to fluorescence from singlet states. To overcome this, we introduced Pt(II) centers into the polymer backbone, forming poly(metallaynes) with enhanced spin-orbit coupling that enables efficient triplet-state emission. These Pt(II)-based polymers, often referred to as Pt-poly-ynes, exhibit near-unity phosphorescence quantum yields at low temperatures and retain strong emission at room temperature. In this talk, I will present the design, synthesis, and characterization of new conjugated Pt(II) poly(metallayne) systems. These materials are processable, thermally stable, and show promising optical properties for applications in LEDs, photocells, nonlinear optics, and display technologies. The study also offers insights into triplet-state engineering in conjugated systems, which can be extended to all-organic analogues.

Keywords: Pt(II) poly-yne, conjugated, polymer, O-E applications, poly(metallayne)s

BIOGRAPHY

Dr. Rayya Al Balushi is an Associate Professor of Chemistry and Head of the Basic and Applied Sciences Department at A'Sharqiyah University. She also chairs the university research ethics and biosafety committee. She received her Ph.D. in Chemistry from Sultan Qaboos University. Her research focuses on the design and synthesis of metalla-yne and poly(metalla-yne) materials and study their structure-property relationships for optoelectronic and catalytic applications. She has published extensively in high-impact journals and received multiple awards for excellence in research, teaching and scientific contributions.