On the Photoinduced Luminescence of C_{60} within Polystyrene Matrices

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Buckminsterfullerene (C_{60}) is a molecular species of icosahedral symmetry with a diameter of approximately 1 nm. Due to these high-symmetry constraints, dipolar emission transitions are formally forbidden. However, it has been observed that when C_{60} is embedded in a polystyrene matrix (PS), ultraviolet irradiation activates a photoinduced process resulting in bright luminescence [1]. Notably, at the single-molecule level, C_{60} has been shown to exhibit single-photon emission [2]. The mechanism facilitating this emission appears to be a conjoint effect of the host matrix and the presence of oxygen, as the phenomenon is not observed in the absence of either component.

Our current efforts are directed toward elucidating the underlying mechanisms of this photoinduced transition. In parallel, we are investigating functionalised C_{60} derivatives as a potential route toward a more deterministic emission process.

In this contribution, we report on our recent experimental progress and discuss the implications of these findings for molecular optoelectronics and quantum communications.

References

[1] C. Zhang et al, Physics Letters 68, (1996) 943-945
[2] R. Lahoz et al, Nano Letters 25, (2025) 15048-15054

Figures

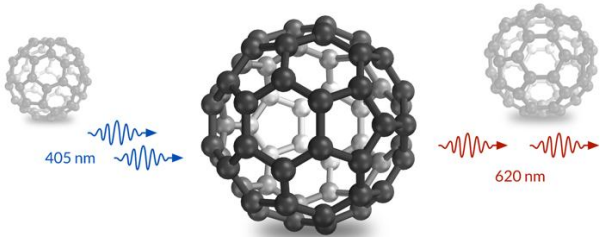

Figure 1: C_{60} embedded in PS presents single photon emission at 620 nm.

This work has been funded by Grant PID2023-147475NB-I00 funded by MICIU/AEI/10.13039/501100011033 and FEDER, UE, by grants 2021SGR01095 and 2021SGR01108 from Generalitat de Catalunya, and by Project CEX2024-001451-M of ICCUB (Unidad de Excelencia María de Maeztu) and MCIN with funding from European Union NextGenerationEU (PRTR-C17.I1).
The author thankfully acknowledges the computer resources at MareNostrum and the technical support provided by MareNostrum5 GPP (IM-2025-2-0060 and IM-2025-3-0046). Molecular graphics and analyses performed with UCSF ChimeraX.