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# Unveiling the Excited-State Dynamics and Coherent Vibrational Oscillations in Pyrene-Based Nanographene

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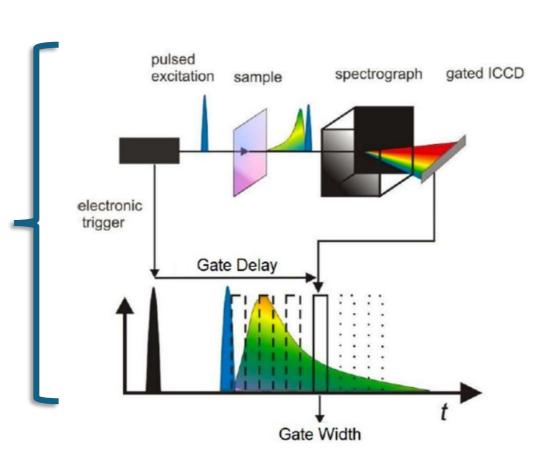
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## INTRODUCTION & AIM

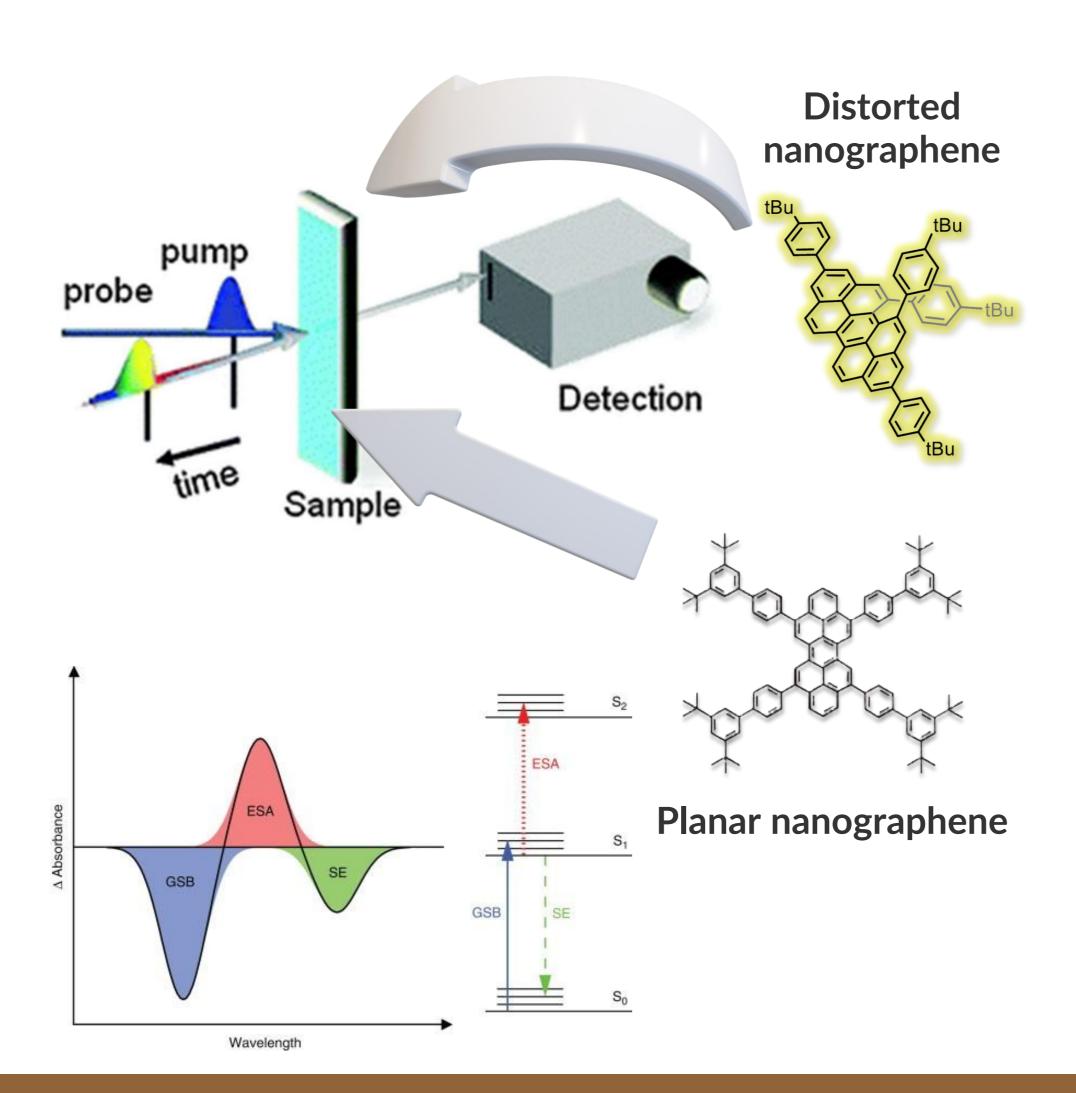
Nanographenes (**NGs**) are a class of 2D nanomaterials based on graphene laterally confined on a spatial scale of a few nanometers, which possess unique optical properties due to quantum confinement and edge effects [1] potential applications in various fields. While many **NGs** adopt planar graphene-like structures, recent advancements in synthesis have enabled the production and study of structurally distorted nanographenes [2]. These distortions, profoundly affect their electronic and optical properties, enabling features absent in planar analogues.

### **METHOD**

- ✓ Steady-state absorption
- Steady-state photoluminescence
- ✓ Time-resolved photoluminescence

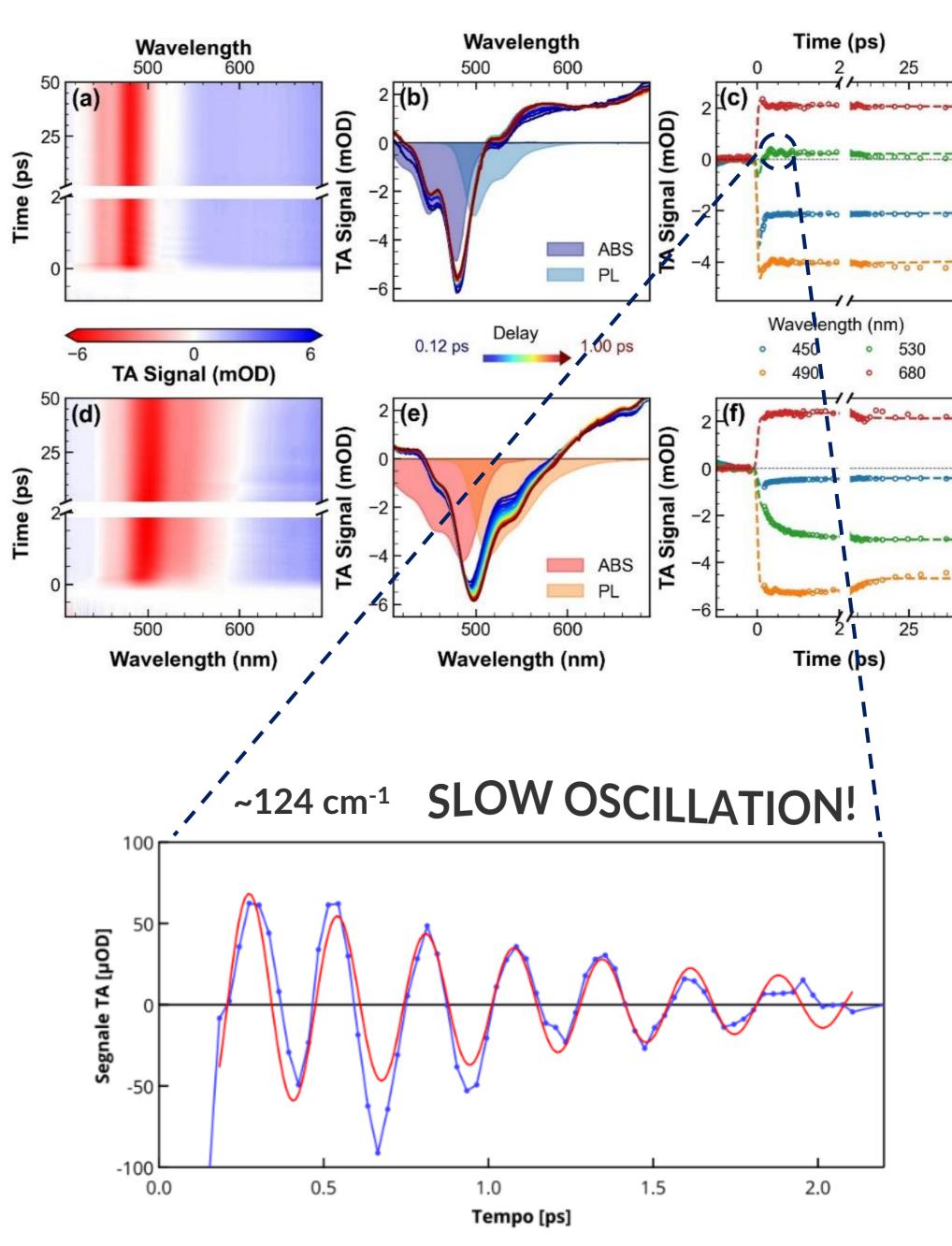


Pump-probe transient absorption (TA) spectroscopy



#### **RESULTS & DISCUSSION**

#### TA spectroscopy measurements



Out-of-plane structural **distorsion** enables **coherent nuclear oscillations** paving the way to the use of these NGs in future **quantum technology**!

#### CONCLUSION

- Nanographenes possess unique optical properties
- Twisted peropyrene shows coherent oscillation not present in the planar peropyrene

#### FUTURE WORK / REFERENCES

- Investigation of these NGs by means of other ultrafast spectroscopy techniques like fluorescence upconversion (FLUC).
- Diversify the set of nanosystems under study, enabling a deeper understanding of the processes that underpin carbon-based nanomaterial behavior.
- [1] Chen et al., Angew. Chem. Int. Ed. 51, 7640-7654 (2012)
- [2] Márquez et al., Chem. Commun. 54, 6705–6718 (2018)