

Cavity-enabled enhancement of ultrafast intramolecular vibrational redistribution over pseudorotation

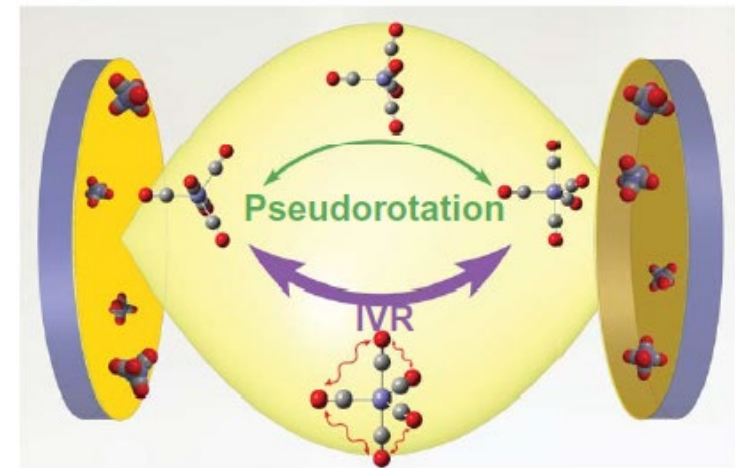
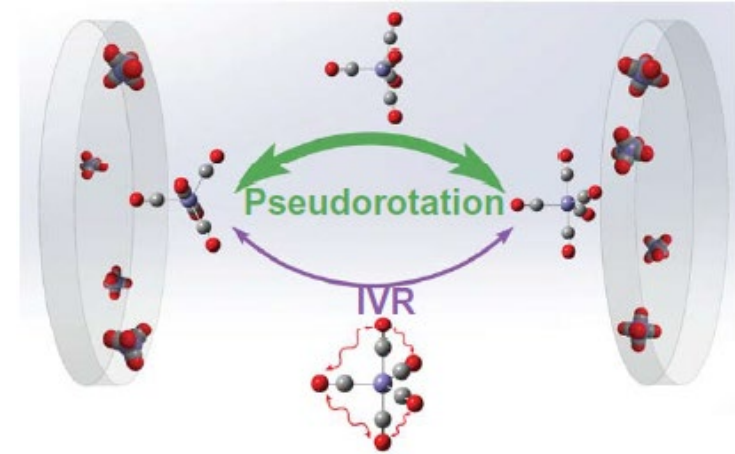
Wei Xiong, University of California-San Diego

Introduction:

We have used ultrafast **two-dimensional infrared spectroscopy** to study the effect of **vibrational strong coupling (VSC)** on a metal carbonyl compound, iron pentacarbonyl ($\text{Fe}(\text{CO})_5$).

Result:

- Polariton excitation accelerated energy exchange, making ***intramolecular vibrational redistribution*** more favorable over ***pseudorotation***
- The effect of VSC on the dynamics of $\text{Fe}(\text{CO})_5$ is **negligible without external (e.g., laser) pumping**.
- The future of VSC-modified thermal chemistry lies in **controlling the dark modes**.



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Broader Impact:

- We held a visiting event for the pre-college students from Outreach Program for Advancing Learning in STEM (OPALS). (figures on the right)
- The undergraduate student Vicente Galicia in our lab has won 2022-2023 Physical Sciences Dean's Undergraduate Award for Excellence.
- Prof. Wei Xiong gave a keynote talk at the OMQ (Optical Molecular & Quantum Science) symposium at University of Oregon.

