



# CMCC Mechanochemistry Discussions

## Online Seminar Series

### *Mechano-Photochemistry: Exploring Mechanical Control of Ground- and Excited-State Processes*

Livestreaming at  
10:00 AM (CT)  
THURS., January 15, 2026

on the CMCC YouTube Channel:

<https://www.youtube.com/channel/UC7eCYPKbGTKpgO7W2bNABxg>



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Mechanical forces are increasingly recognized as a versatile external stimulus to control molecular behavior, from shifting equilibria and lowering activation barriers to control reaction mechanisms. While mechanochemistry is now well established, the corresponding question for light-driven reactivity—can we use mechanical forces to control photochemistry and photophysics?—is still comparatively underexplored. Recent advances and open challenges in mechano-photochemistry are discussed, focusing on molecular-level models that connect an applied mechanical constraint to changes in excited-state landscapes and, ultimately, to observable photochemical outcomes. It is discussed how controlled forces can tune key photochemical observables, including absorption/emission energies, excited-state lifetimes, quantum yields, and photoproduct distributions, emphasizing mechanistic interpretations in terms of force-modulated potential-energy surfaces, conical-intersection accessibility, and non-adiabatic branching.

Selected case studies will include mechanically induced modulation of chromophore spectra and dynamics, as well as the mechanical activation of otherwise “forbidden” photoreactivity, highlighting how forces can open or bias specific photochemical pathways. Our recent efforts to build predictive mechanochemical models for ball-milling reactivity are also presented, where the mechanical environment is modeled through wall-type forces and the corresponding mechanochemical model. Building on this framework, we are now expanding these models toward excited-state control, aiming to bridge ball milling with mechano-photochemical concepts.



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