Ben-Gurion University of the Negev
אוניברסיטת בן-גוריון בנגב

Graduate Students Seminar

Department of Chemistry

Sunday June 25th, 2023

Time 14:30

Bldg. 43 Room 015

Nir Lemcoff

Under the supervision of Prof. Yossi Weizmann

Plasmonic visible–near infrared photothermal activation of olefin metathesis enabling photoresponsive materials

Light-induced catalysis and thermoplasmonics are promising fields creating many opportunities for innovative research. Recent advances in light-induced olefin metathesis have led to new applications in polymer and material science, but further improvements to reaction scope and efficiency are desired. In my seminar, I will present the activation of latent ruthenium-based olefin metathesis catalysts via the photothermal response of plasmonic gold nanobipyramids.1 Simple synthetic control over gold nanobipyramid size results in tunable localized surface plasmon resonance bands enabling catalyst initiation with low-energy visible and infrared light. This approach was applied to the ring opening metathesis polymerization (ROMP) of dicyclopentadiene, affording plasmonic polymer composites with exceptional photoresponsive and mechanical properties. Moreover, this method of catalyst activation was proven to be remarkably more efficient than activation through conventional heating in all the metathesis processes tested. This study paves the way for providing a wide range of photoinduced olefin metathesis processes in particular and photoinduced latent organic reactions in general by direct photothermal activation of thermally latent catalysts.

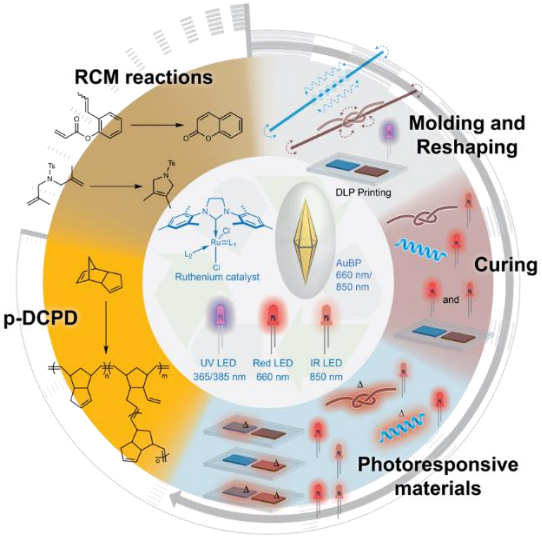

Figure 1. Thermoplasmonic activation was shown to enable efficient catalyst activation with low energy visible and infrared light.

References:

(1) Nir Lemcoff, Noy B. Nechmad, Or Eivgi, Elad Yehezkel, Ofir Shelonchik, Ravindra S. Phatake, Doron Yesodi, Anna Vaisman, Aritra Biswas, N. Gabriel Lemcoff and Yossi Weizmann*. Plasmonic visible–near infrared photothermal activation of olefin metathesis enabling photoresponsive materials. Nat. Chem., 15, 475-482 (2023). https://doi.org/10.1038/s41557-022-01124-7.