



Shrayesh Patel
Assistant Professor

Areas of Research Expertise

Energy conversion, polymers, batteries, thermoelectrics

Research Overview: The Patel Group

The Patel group focuses on functional polymeric materials (e.g. electronic conductors, ion conductors, redox-active) for energy conversion and storage applications.

Contact

Phone

773. 702.7717

Address

Eckhardt Research Center
Room 209
5640 South Ellis Avenue
Chicago, IL 60637

Email

shrayesh@uchicago.edu

Website

ime.uchicago.edu/patel_group

Assistant

Ayanna Nataki Green

Research

Shrayesh Patel's research focuses on energy conversion, with an emphasis on batteries and thermoelectrics. His work on fuel cells, batteries, thin film transistors, and thermoelectrics directly contributes to more sustainable and cleaner alternative energy technologies.

Using synchrotron x-ray scattering and spectroscopy techniques, the Patel group advances understanding of functional polymers at the molecular, nano-, and micro-scale. Experts in the characterization of polymers, they can identify charge transport, electrochemical, and morphological properties critical to the performance of these materials.

Patel has made important contributions to understanding the limits of electrical performance of semiconducting polymers. His accomplishments in this area include the development of innovative processing techniques for semiconducting polymers. These improve alignment and pi-stacking, leading to high charge mobility exceeding the performance of amorphous silicon. Patel has also applied

powerful analytical methods (near edge x-ray absorption fine structure spectroscopy and soft x-ray scattering) to understand and prove the mechanisms of alignment and performance enhancement. This work is both scientifically insightful and technologically relevant for the commercialization of flexible electronic devices.

Patel is a scientific and technological leader in the effort to develop inherently safer batteries. He is co-inventor on a patent describing the simultaneous conduction of electronic charge and lithium ions in block copolymers, which could help leverage functional polymers for new battery technologies for transportation and the electric grid.

Interested in thermal energy harvesting and management, Patel is exploring this emerging area of organic thermoelectric materials. This work could have a profound impact on energy conservation and efficiency.

Bio

Patel completed his undergraduate degree at the Georgia Institute of Technology in Chemical and Biomolecular Engineering in 2007, then earned his PhD in Chemical Engineering from the University of California, Berkeley in 2013. Before joining the IME as an Assistant Professor, Patel was a postdoctoral research associate in the Materials Research Laboratory at the University of California, Santa Barbara.