



Department of Materials Science and Engineering Seminar Series 2026

MICROSTRUCTURE AND ENERGY DISSIPATION IN POLYUREA: MOLECULAR INTERACTIONS AND MATERIAL MODIFICATION

Gladys Tan Shi Xuan

Date and time: 06th November 2026, 2:00pm

Venue: EA-06-05

Abstract

Polyurea elastomers have gained significant attention as protective materials due to their excellent mechanical properties and ability to mitigate high-velocity impacts. Polyureas are segmented polymers comprising hard and soft segments that separate due to thermodynamic incompatibility. The hard segments form distinct domains stabilised by intermolecular hydrogen bonding and dispersed within the soft-segment matrix. While these hard domains contribute significantly to mechanical reinforcement, their influence on energy dissipation under extreme loading conditions remains an area of research. This study investigates energy dissipation in segmented elastomers through chemical modification and nanofiller incorporation. Furthermore, a descriptor is developed to quantify changes in hydrogen-bonded hard domains during deformation and relate these structural changes to energy dissipation performance under high strain-rate conditions.

Biography

Gladys Tan received her B.Eng. from the National University of Singapore (NUS) in 2022. She is currently a Ph.D. candidate in the Department of Materials Science and Engineering at NUS, under the supervision of A/Prof Daria Andreeva-Baeumler. Her research focuses on polyurea structure–property relationships and energy dissipation for high-velocity impact protection.

Please join us!

HOST: Asst. Prof Zhao Ming