

演題: **Target-Oriented Synthesis  
of Macromolecular Silanes**

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日時: 2026年4月2日(木) 16:30~18:00

場所: フロンティア応用科学研究棟 2階セミナー室

共催: 北海道大学化学反応創成研究拠点 (WPI-ICReDD)

要旨:

Silicon is the semiconductor behind technologies like computer chips, solar cells, and batteries. The conventional approach to silicon-based materials is “top-down”: in a high-temperature process sand ( $\text{SiO}_2$ ) is converted to silicon (Si) ingots, which is carved down to smaller components. This process only accesses the most thermodynamically stable form of silicon, leaving uncovered vast swaths of structure-function space. Can we instead build silicon from the bottom-up, atom-by-atom? Inspired by the cyclic subunits embedded within crystalline silicon, we elaborate cyclosilane “building blocks” to the poly(cyclosilane)s, a new polymeric form of an essential semiconductor. We have realized unprecedented levels of stereochemical and architectural control of structure, from which structure-based control of light absorption at the molecular and macromolecular level has emerged. The presentation will conclude on a new direction for macromolecular silanes, focusing on the wide-ranging impact of silicon’s greater polarizability on polymer mechanical properties, from the single strand to the network. We demonstrate impacts on single strand elasticity, as well as toughening effects arising from selective mechanochemical scission.

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