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Biographical information:

Prof. Hyeonseok Yoon earned his B.S. in Chemical Engineering from Hanyang University in 2002, and his M.S. (2004) and Ph.D. (2008) in Chemical and Biological Engineering from Seoul National University. After completing two years of postdoctoral research at the Massachusetts Institute of Technology (MIT), he joined Chonnam National University as a faculty member in 2010, where he served as Associate Dean of the Graduate School from 2023 to 2025. From mid-2018, he also worked for one year as a Guest Faculty member at Lawrence Berkeley National Laboratory (LBNL). Since September 2020, he has served as Director of the BK21 Program for Advanced Chemicals and Materials at Chonnam National University. He currently serves as Section Editor-in-Chief of *Polymers* and as an Editorial Board Member of *Scientific Reports* and *Macromolecular Research*. His research interests include functional nanomaterials, nanohybrids, sensors, heterogeneous catalysts, and energy materials and systems.

Title: Fabrication of Functional Organic/Inorganic Nanomaterials and Their Applications

(Subtitle: How Can We Conduct Research More Efficiently?)

Abstract

Functional organic/inorganic nanomaterials offer a versatile platform for next-generation sensors, electrocatalysts, supercapacitors, and batteries. This talk introduces a fabrication strategy based on polymer nanoparticles prepared through micelle templating, where morphology is systematically tuned from spherical nanoparticles to tubular nanostructures. The polymer nanoparticles are subsequently converted into carbon-based nanomaterials that preserve the parent morphology while enabling independent control of microstructure and chemical composition through polymer design and processing conditions. This

framework provides precise tuning of pore architecture, degree of graphitization, and heteroatom incorporation, which collectively govern electrochemical and catalytic performance. The talk further shows that micelle templating and polymer precursor chemistry constitute a broadly applicable synthetic methodology. Because the same core strategy can be transferred across different polymer precursors and target compositions, a single framework can generate a diverse library of nanohybrids with consistent design logic, enabling direct comparison across applications. This approach supports systematic structure-property correlation studies and accelerates optimization by allowing application-specific parameter tuning within a shared synthetic platform. Overall, this talk highlights both the scientific potential of functional organic/inorganic nanomaterials and a practical route toward efficient and scalable research workflows.