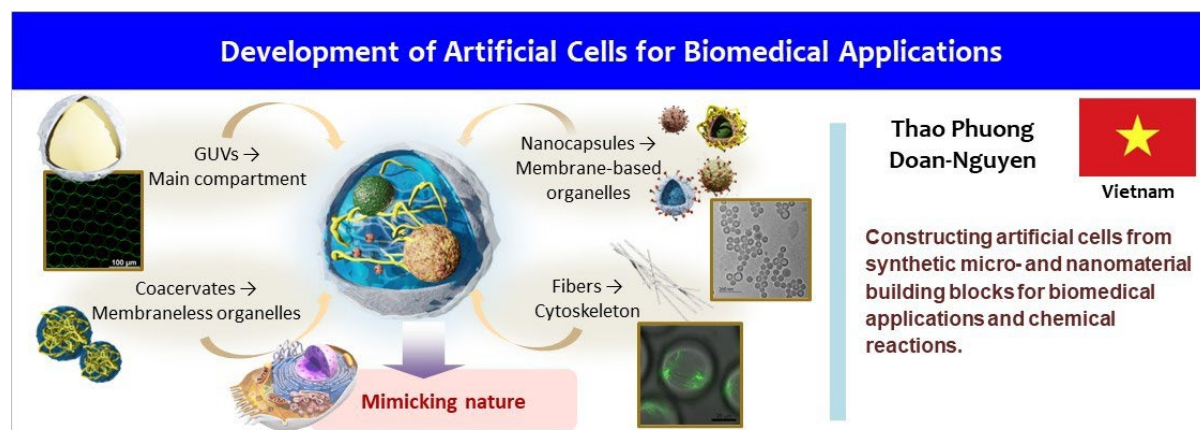


Development of Artificial Cells for Biomedical Applications

ICYS Research Fellow Dr. Thao Phuong DOAN-NGUYEN



■ Research

My goal is to find new therapeutic treatments for important health problems using artificial cells. Artificial cells are biomimetic soft materials that mimic the compartmentalization and certain functions of living cells. Multiple biological barriers together with the complex environment in the human body require dosage forms to be more and more sophisticatedly designed. For instance, to reach a target tissue, nanoparticles need to have a long circulation time inside the body with minimum adsorption of unfavorable protein corona, and successfully evade the mononuclear phagocyte system. I strive to overcome these barriers by optimizing the design and fabrication of artificial cells with hierarchical structures composed of micro- and nanomaterials building blocks. I focus on new materials and take advantage of their unique characteristics, for example, the ability of ultrasmall nanocapsules to penetrate into cell nucleus, or the ability of coacervates to selectively sequester molecules or mimic membraneless organelles of nature cells. In the long term, I would like to gain full control over the formation and functions of artificial cells by working on three main objectives: obtaining advanced methods for the assembly of artificial cells, gaining fundamental understanding of synthetic organelles and thus, bringing the artificial cells to biomedical applications. By creating minimal artificial cells as drugs, I hope to also contribute fundamental knowledge to unravel the tenacious question of the origin of life.

■ Comments

I came to NIMS after 2.5 years working at the Max Planck Institute for Polymer Research in Germany. I applied to NIMS simply because it is the best institute for materials research in Japan. I was attracted to ICYS program because it supports the development of early-career researchers as independent scientists, working on their own ideas and discretion but with full support from NIMS. Coming to ICYS, I am very pleased with the excellent facilities, technical and clerical support as well as the international working environment here. As a young researcher, I am looking forward to use this opportunity to nurture my growth and maturity in science.

■ Link

<https://www.nims.go.jp/icys/research/#D-NGUYEN>