Jung Kwon (John) Oh, J Nanomater Mol Nanotechnol 2018, Volume 7
DOI: 10.4172/2324-8777-C7-037

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Dual smart block copolymer nanoassembly platform for cancer therapy

Nanoscale platforms have been developed to improve the delivery and biodistribution of small anticancer therapeutics in chemotherapy. Self-assembled nanoassemblies based on amphiphilic block copolymers offer a broad choice of materials as promising nanocarriers for tumor-targeting drug delivery applications. It is imperative that drug-loaded nanocarriers are able to release encapsulated anticancer drugs in a rapid and controlled fashion after being taken up by cancer cells after extravasation into tumor tissues from blood circulation. Stimuli-responsive degradation (SRD) is a promising platform. SRD-exhibiting nanocarriers are stable under physiological conditions during blood circulation; however, they can be dissociated in a controlled fashion, thus leading to the enhanced release of encapsulated drugs as cellular components provide the appropriate stimuli to trigger biodegradation in microenvironments of tumors and inside cancer cells. Our group has put significant efforts to develop various strategies to synthesize novel reduction-responsive block copolymer-based nanocarriers with varying densities of disulfide linkages positioned at single and dual locations. Recently, we have focused on an effective SRD strategy that centers on the development of new intracellular nanocarriers having multiple stimuli-responsive cleavable linkages at multiple locations (denoted as multi-location multiple SRD (ML-MSRD) strategy). This strategy dramatically increases versatility since responses to each stimulus can independently and precisely regulate the release of encapsulated biomolecules at several locations.

Biography

Jung Kwon (John) Oh is a Canada Research Chair Tier II in Nanobioscience and an Associate Professor in the Department of Chemistry and Biochemistry at Concordia University in Canada. With his PhD degree from the University of Toronto in Canada, he completed his postdoctoral research at Carnegie Mellon University in the USA. He had also R&D experience in industries, Korea Chemical Company and Dow Chemical Company over 10 years. He has authored >105 peer-reviewed publications and book chapters as well as holds 18 international patents. His research has been recognized with several prestigious awards, selectively including PCI Outstanding Paper Award in 2010, Canada Research Chair Award in 2011-2021, and Dean's award to Excellence in Scholarship Mid-Career in 2016. His research interests involve the design and processing of macromolecular nanoscale materials for biomedical and industrial applications.

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