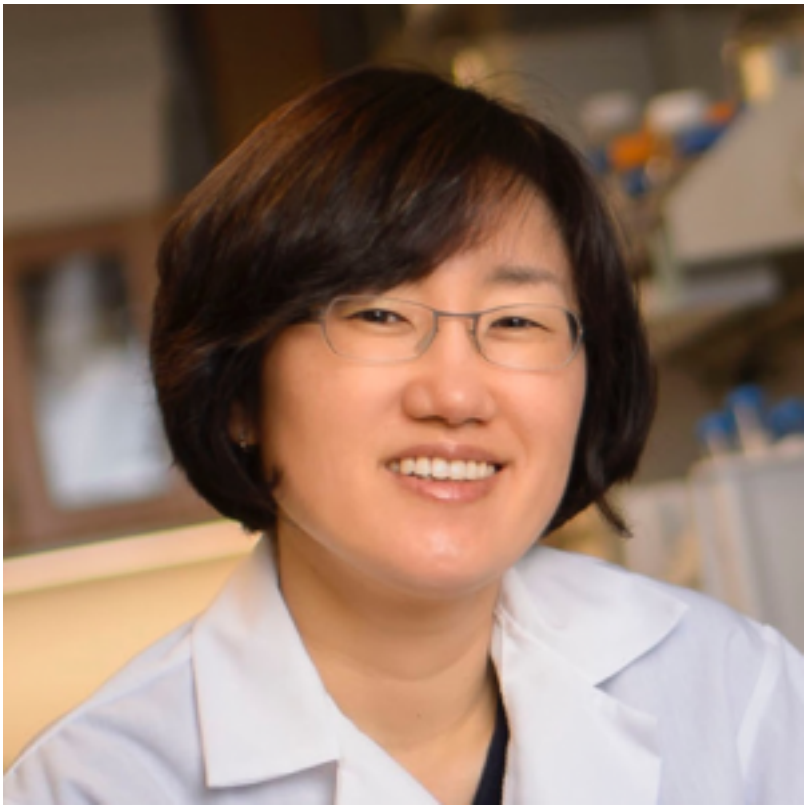
Monthly Publication Highlight - Dr. Yoon Yeo



The Purdue College of Pharmacy is pleased to honor and recognize the outstanding research and scholarship generated by our faculty each month. This month we highlight Dr. Yoon Yeo, Professor and Associate Department Head of Industrial and Physical Pharmacy. Dr. Yeo's recent publication, "Camouflaging Nanoparticles for Ratiometric Delivery of Therapeutic Combinations" can be read in Nano Letters (February, 2019; DOI: https://pubs.acs.org/doi/abs/10.1021/acs.nanolett.8b04017. Dr. Yeo conducted the study along with Fanfei Meng (post-doc), Jianping Wang (graduate student), Qineng Ping (collaborator at China Pharmaceutical University).

This study describes a new strategy to deliver combinations of drugs with different physicochemical properties, which have a strong biological rationale to use together but are technically difficult or suboptimal to deliver by a single carrier. To tackle this challenge, we propose to load each drug in a chemically compatible nanoparticle carrier respectively and administer the mixture in a desirable ratio and sequence. To help colocalize different nanoparticle carriers in the same target tissues, we camouflage them with a common surface and equalize their functional properties via a simple and versatile surface modification method based on a natural polyphenol, tannic acid. In this study, the surface of five different nanoparticles (NPs), such as carboxyl-terminated or amine-terminated polystyrene NPs, liposomes, poly(lactic-co-glycolic acid) (PLGA) NPs, and mesoporous silica NPs (MSNs) are modified with folate-conjugated polyethylene glycol via tannic acid-based layers. We show that (i) the surface-modified NPs, despite the difference in the cores, had similar physicochemical properties and interactions with folate receptor-overexpressing KB cells, (ii) their mixtures interacted with common cell targets in a desired ratio, and (ii) the camouflaged PLGA NPs and MSNs were co-delivered to the tumor better than bare NP counterparts in KB-tumor bearing mice. These results support that tannic acid facilitates the surface modification of different NPs and enables their codelivery to common targets. "This approach can make it easy to co-deliver synergistic drug combinations to target tissues in the optimal ratio and sequence, which may otherwise be difficult to do because of distinct physicochemical

properties of drug components.”