

IOWA STATE UNIVERSITY

Materials Science & Engineering Department

Dandong Wang

Final Oral Examination
MS Student with Kaitlin Bratlie

Monday, May 19 · 1:00 PM · 1322 Hoover Hall

“The effect of p(NIP Am-co-AAc) particle chemistry on internalization by activated and non-activated macrophages”

Material properties play a key role in cellular uptake of polymeric particles. In present study, we have investigated the effects of material characteristics such as contact angle, zeta potential, melting temperature, and alternative complement activation on the cellular uptake and different pathways of entry on pro-inflammatory, pro-angiogenic, and non-activated macrophages by using biopolymers (~ 600nm), functionalized with 14 different molecules. Understanding how material parameters influence internalization for different macrophage phenotypes is important for targeted delivery to specific cell populations. Here, we demonstrate that material parameters effects on alternative pathway of complement activation, particle internalization, and the mechanisms by which those particles are internalized. Our data revealed that negative charge, the number of hydrogen atoms, and the number of 2° carbon atoms positively impacted pro-inflammatory macrophage internalization; decreased complement activation and increased sp² carbon atoms caused pro-angiogenic macrophages to uptake particles; and internalization by non-activated macrophages can be increased by decreasing the material melting temperature. These findings demonstrated that targeted drug delivery to macrophages could be achieved by exploiting material parameters.