

## Size Controlled Nanoparticle Surfactants for Producing Novel Structured Polymeric Materials

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KAIST  
(bjkim02@kaist.ac.kr)

The mixing of polymers and NPs has opened pathways for engineering flexible composites that exhibit advantageous optical, electrical, magnetic and mechanical properties. Here I would like to introduce two examples of nanoparticle (NP) surfactants in producing novel functional nanomaterials. In the first part of talk, I will discuss the size and shape effect of size controlled NPs as a surfactant on the polymer blend system. We have developed a simple and powerful approach to fabricate a continuous conducting polymer film with an ultralow threshold that is based on Au NP surfactants. The addition of a very small amount of Au NPs dramatically reduced the volume fraction threshold for producing the conducting polymer film with high electrical and mechanical properties. In the second part of talk, I will introduce a powerful strategy of using size controlled Au NP surfactants to tailor both the external shape and internal nanoscale morphology of block copolymer (BCP) particles. The key to the successful generation of these novel structures is the use of size-controlled Au NPs, in which the relative size-ratio of Au NPs ( $d$ ) over the Au NP-hosting domain ( $L$ ), i.e.,  $d/L$ , was critical for their precise positioning to determine their ability to function as surfactants in emulsions.