Particle Design Engineering for Drug Delivery System

Prof. Yoshiaki Kawashima

Pharmaceutical Engineering, School of Pharmaceutical Sciences, Aichi Gakuin University, ***Japan***

Particle design engineering has been developed mainly in the pharmaceutical industry to create or design new physicochemical properties of particles (powders) to improve pharmaceutical processing or to create new functions for DDS to keep chemical properties unchanged.
In this presentation, how particulate properties being designed for creating desired properties are reviewed. Particle design engineering method is classified into two categories, modification of crystal form and microparticulate properties. Modification of crystal form includes polymorphism, amorphism and etc with homogeneous or heterogeneous system with excipient. Modification of micromeritic properties, such as particle size (diameter) , particle shape, particle density and etc is carried out industrial scale. A unique hybrid system with spherical crystallization technique was found for particle design method by our teams.
By using this technique nanoparticulate drug delivery system for pulmonary administration of antiasthmatic agent, insulin and etc. has been developed. Development of pulmonary p-DNA, si RNA and nucleic acid (gene delivery system) will be described. Particle design engineering being a “key” to open ideal medical system (Ex. nanomedicine) will be discussed for establishing 21st century medical system.