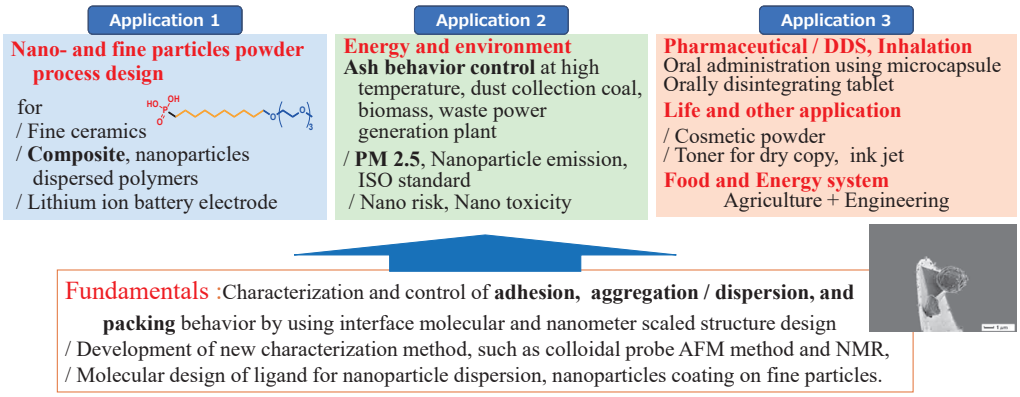
The KONA Award 2022

The KONA Award has been presented to researchers who have greatly contributed to research and development as well as education in the field of Powder and Particle Science and Technology since 1990. It was originally given by Hosokawa Micron Corporation, but now is presented to researchers from all over the world by the Hosokawa Powder Technology Foundation annually. The application for this award requires a specified recommendation form written in English to be submitted to the President of the Hosokawa Powder Technology Foundation. The award candidates are reviewed by the KONA Award Committee members, and the results are reported to the Selection Committee of the Foundation for the nomination of the awardee. It needs to be finally approved at the Board of Directors' meeting of the Foundation. The KONA Award is presented at a ceremony in or outside Japan with a plaque and a prize of one million yen. The KONA Award 2022 has been presented to two researchers this year, namely Prof. Hidehiro Kamiya and Prof. Toshitsugu Tanaka from Japan. The KONA Award plaques were presented to the awardees at the 55th Symposium on Powder Technology on September 4, 2023.

Dr. H. Kamiya has realized various achievements in powder technology, particularly those related to fine and nanoparticles, and has widely disseminated his activities overseas. Based on the characterization of the surface interaction and structure of nanoparticles, he investigated the fundamentals associated with the aggregation behavior of nanoparticles in liquid. He discovered an organic ligand structure with universal dispersibility of nanoparticles into various polar and nonpolar organic solvents. By synthesizing various ligands with different molecular structures, he discovered the optimum ligand molecular structure for universal dispersibility. Such surface-treated nanoparticles were applied to prepare new free-standing, rollable, and transparent silicone polymer films.

Utilizing fine particles and microcapsules measuring larger than 100 nm in diameter, he investigated the original molecular design of polymer structures on particles and capsules to characterize and control surface interaction via colloid probe AFM. In the gas phase, the adhesion of fine ash particles at high temperatures hindered the stable operation of various energy systems. Hence, he developed original systems for characterizing the particle adhesion force and shear strength of single ash at high temperatures based on a split-type tensile strength tester. Since real ash includes various chemical elements, he developed a model of ash particles prepared from pure silica as well as other metal oxide fine particles, with the addition of alkali metal or phosphorus. Based on the fundamental characterization method and ash model, he investigated the mechanism of increasing ash particles generated from different plant and fuel sources. To control the adhesion behavior of ash, he proposed the addition of alumina and other inorganic nanoparticles. The characterization,

At the KONA Award presentation ceremony,
President Yoshio Hosokawa (Left) and 2022 KONA Awardee Prof. Hidehiro Kamiya (Tokyo Univ. of Agriculture and Technology, Japan).



Selected research achievements for the KONA Award 2022 (Prof. Hidehiro Kamiya): Particle adhesion and aggregation behavior characterization and control.

simulation and modeling, and control of adhesion and aggregation have been expanded to various industrial fields, including pharmaceuticals, cosmetics, and pigments.

The results above have been published in 243 original papers (182 WoS papers) and 76 review papers. He has filed 23 patents, published 55 books, and presented 37 keynote lectures at international conferences. Additionally, he has contributed to the activities of the "Association of Powder and Particle Industry and Engineering in Japan, APPIE" as a coordinator of the "Fine Powder Nanotechnology" group from 2001 to 2021. Furthermore, he has served as a vice chair of the committee of "Nanoparticle Safety" and an editor for the book, "Safe Use of Nanoparticles."

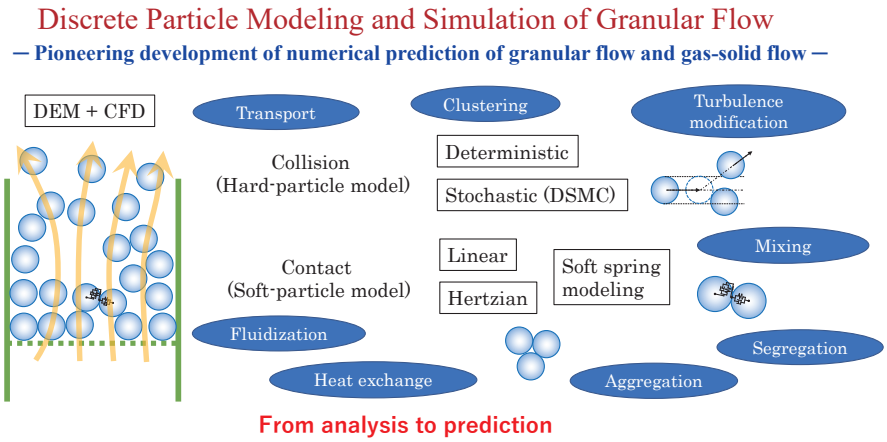
Dr. T. Tanaka has been conducting research at Osaka University, focusing on fluid engineering and powder technology, particularly with regard to discrete particle modeling and simulations of gas–solid flows and granular flows, for 38 years. He began his career at the dawn of discrete particle simulation. When he started his numerical research, only the Lagrangian numerical simulation neglecting particle–particle collision or contact and the two-fluid-model simulation were available. He made pioneering works for modeling both collision-dominant flows and contact-dominant flows.

First, he proposed a deterministic method for calculating of particle–particle collision to study the effect of particle–particle collision on the diffusion of particles in dilute gas–solid flows, and to study the effect of particle–particle collision on the spatial structure of particles in gas–solid turbulent flow. To reduce the calculation cost, he proposed the utilization of DSMC method to gas–solid flows, and successfully predicted the particle cluster formation observed in the riser of circulating fluidized bed.

His most brilliant achievements were the developments of the DEM-CFD model and simulations. He made novel discrete simulation models and methods to reproduce a plug flow in a horizontal pipe and fluidized beds. Since then, his model and simulation method have been widely used for basic studies of dense gas–solid flows and applied for many industrial applications. The total number of citations of his pioneering papers on the DEM-CFD model is over 3400, demonstrating the excellence of his pioneering achievements. He extended his work to the large-scale DEM-CFD simulation of fluidized behavior in three-dimensional fluidized bed, and to a reduced spring constant model for cohesive particles.

For the above achievements, Dr. Tanaka was awarded the Best Paper Award of the Society of Powder Technology, Japan in 2012, JSME Fellow from JSME in 2011, and Distinguished Achievement Award of the Information Center of Particle Technology, Japan in 2004, among other awards. Dr. Tanaka is an acknowledged world leader, especially in the field of numerical modeling and simulations of gas-solid flows and granular flows, and has made significant contributions to the development of powder science and technologies worldwide

At the KONA Award presentation ceremony,
President Yoshio Hosokawa (Left) and 2022 KONA Awardee Prof. Toshitsugu Tanaka (Osaka University, Japan).



Selected research achievements for the KONA Award 2022 (Prof. Toshitsugu Tanaka): Development of discrete particle modeling and simulations of gas-solid flows and granular flows.