

Quantitative analysis of dispersion state for microstructures inside two-dimensional systems

김동재¹, 유진욱^{1,2}, 남재욱^{1,†}
¹서울대학교; ²화학생명공학부
(jaewooknam@snu.ac.kr[†])

Numerous studies have been elucidated that micro-/nano-structures composed of particles (or fillers) inside (quasi-) two-dimensional systems such as coated films, composites, and elastomers can directly affect various performances of the systems including electrical, mechanical, thermal, and rheological aspects. Accordingly, quantitative evaluation of dispersion state, i.e., how well the particles are dispersed in a given system, is a crucial step for understanding relations between micro-/nano-structures and performances of films or composites.

In this study, we propose a new indicator DoD (degree of dispersion) that assesses the dispersion state by combining two simple approaches: random walk simulation and cloud overlap estimation. By numerical experiments, we confirmed that the proposed indicator possesses stability, effectivity, and flexibility. Besides, random walk simulation can evaluate inter-cluster dispersion, meanwhile, cloud overlap estimation senses intra-cluster dispersion, i.e., hierarchically structure analysis also can be available.