DEM Simulation of Binary Blend Mixing of Cohesive Particles in a High Intensity Vibration System

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Abstract

The effects of processing intensity, time and particle surface energy on mixing of binary cohesive blends (size ratio 1:2, fine concentration at 10 %) in high intensity vibration system were investigated via DEM simulations. Results show that both increasing processing intensity from 50 to 100 Gs and reducing surface energy from 50 to 0.5 J/m2 lead to a faster mixing rate. Mixing Bond number (⟦Bo⟧ _m) was introduced to capture the effective mixing rate, Rm; higher ⟦Bo⟧ _m corresponding to lower mixing rate. The coefficient of variation, Cv, formed the basis for the mixing quality and Rm, while the mixing action is quantified by the product of Rm and mixing time (Pr,t). Simulation results show that Cv values drop initially, and then rise with Pr,t. Hence, low Pr,t indicates inadequate mixing intensity, while high Pr,t most likely indicates mixture segregation, and therefore too high or too low Pr,t values should be avoided.

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