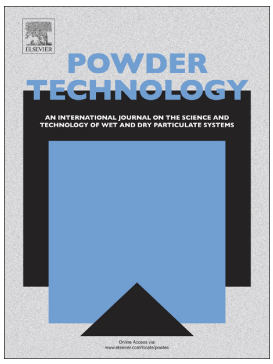

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Experimental study on electrostatic charges and discharges inside storage silo during loading of polypropylene powders

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Abstract

As polymer powders have high resistivity, they can easily be charged due to the repeated collision and separation of particles along with particle-wall friction in a pneumatic conveying system. This study experimentally investigated the electrostatic charges and discharges inside a conical-cylindrical silo during the loading of polypropylene (PP, 2 - 3 mm) powders. The silo was continuously loaded with PP powders at 0.68 kg/s to a total mass of approximately 800 kg. To measure electrostatic charges of the PP powder being loaded into the silo, a Faraday cage with a cover was set at a distance of 50 mm from the center of the loading pipe inside the silo. To observe electrostatic discharges inside the silo, an image-intensifier unit was set on the windowpane of the silo roof. The results show that the charge-to-mass ratio of the loading PP powder remained at a constant value of approximately -12 μC/kg. The ring-shaped light, which is the electrostatic discharge, appeared clearly at the center of the silo approximately 7 s after initial loading. The diameter of the ring-shaped light grew larger as time passed after loading. This was because the diameter of the accumulated PP powders increased in the silo during the