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Size segregated ring pattern formation in particle impactors J. R. SAYLOR, S. A. FREDERICKS, Clemson University — Typical particle impactors consist of a nozzle that directs a particle laden flow onto a plate, and is designed to capture particles greater than a cutoff diameter. Connected in series as a cascade, with each impactor designed to have a progressively smaller cutoff diameter, the particle size distribution can be measured. Typical impactors utilize a nozzle-to-plate distance S that is on the order of one nozzle diameter W, $S/W \sim 1$, and give a nominally Gaussian particle deposition pattern on the plate. We explored conditions where $S/W << 1$ and observed deposition patterns consisting of very fine rings. Moreover, we found that the ring diameter increased with decreasing particle diameter and the ring thickness increased with particle diameter. These results suggest a potential method for sizing particles by using the mature technology of impactors in a different way. Potential mechanisms for how these ring patterns are formed will be discussed. We note that prior studies have observed conditions where particle deposition patterns exhibited "halos". These halos appear less distinct than the rings we have observed, and it is unclear whether they are related.

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