

Evaluating Effectiveness of Dust By-product Treatment with Scrubbers to Mitigate Explosion Risk in ZrO_2 Atomic Layer Deposition Process

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In processes of manufacturing semiconductors, reactive by-products (as a form of fine powder, i.e., dust) are deposited in pipes installed on post processing and exhaust systems, potentially involving a considerable explosion risk. In this study, the effectiveness of scrubber methods (e.g., dry scrubber and burn-wet scrubber) to mitigate the risk was evaluated. To this end, three by-products generated from a ZrO_2 atomic layer deposition (ALD) process were collected from semiconductor manufacturers, which were treated with different methods (i.e., no treatment, treatment using dry scrubber, and treatment using burn-wet scrubber), and their characteristics were analyzed and compared. Dust explosion testing proved that robustness of explosion of the untreated by-product is about 7 times higher than the by-product treated with the burn-wet scrubber. Based on the results of this study, it would be suggested that burn-wet scrubber is a useful treatment method to decrease the explosion risks caused by dust by-products generated from ALD in semiconductor manufacturing processes.