CVD Precursors and Associated By-Products – Ensuring Maximum Chamber Productivity

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The range of CVD process precursor materials and associated reaction by-products vulnerable to condensation in chamber vacuum dry pump solutions is expanding. In this regard, challenging substances include ammonium chlorides, ammonium fluorides, hafnium chlorides, sulphur-based compounds, liquid precursors, and others. To some extent, the tendency for materials to condense in most vacuum systems can be reduced by diluting the exhaust with inert gas, as is done to control flammability. If, however, dilution rates are reduced to lower cost and improve abatement efficiency, an alternative strategy is needed to control condensation of liquids and solids in the process exhaust stream.

Clearly, the major perceived risk associated with condensation is blockage of the chamber vacuum solution and a consequent process interruption caused by excessive dry-pump exhaust pressure or breach of seal integrity due to high pipe internal pressure. However, there are also other serious hazards that may result from condensed materials in the vacuum solution. To counter the condensation threat and improve system safety and productivity, providing the capability to run the vacuum solution at optimized and uniformly controlled temperatures is critical to the success of the manufacturing process. To ensure no condensation occurs, a clear understanding of the CVD precursors and associated by-product material condensation points is essential. Therefore, the optimum vacuum solution can be designed for the benefit of improved productivity through reduced equipment downtime. In addition, health and safety risks to operating and service personnel can be greatly reduced.