Aerosol Particle Technology: From carbon black to devices (breath sensors)

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For over a century, this technology enables synthesis of nanostructured materials (carbon black, fumed oxides & metals) impacting production of tires, paints, optical fibers, photocatalysts, pharmaceutics & microelectronics. Even though its early development was largely Edisonian, today is on a firm scientific basis through multiscale process design and sophisticated diagnostics. So, it's attractive for its scale-up to tons/h and its capacity to make materials with characteristics inaccessible by wet chemistry. Coagulation, sintering and surface reactions largely determine product characteristics through the high temperature particle residence time, as with classical *reaction engineering*. High particle concentrations during manufacturing lead to rapid attainment of asymptotic size distributions (self-preserving) and structures (fractal-like). So particle dynamics can be readily interfaced with fluid mechanics facilitating process design for synthesis of particles exhibiting superior performance in catalysis, gas sensing and biomedics that lead also to spinoffs blossoming in niche markets.