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The Synthesis of Novel Materials via Dielectric Barrier Discharge Plasma Reactors CHI-CHIN WU, JENNIFER GOTTFRIED, US Army Rsch Lab - Aberdeen, KELSEA MILLER, Texas Tech University, ROSE PESCE-RODRIGUEZ, US Army Rsch Lab - Aberdeen, EMSB TEAM — This work describes recent ARL research on the production of novel materials via several prototype atmospheric dielectric barrier discharge (DBD) plasma reactors. A bottom-up approach was exploited to synthesize novel carbon-containing deposits via plasma-assisted chemical vapor deposition. Issues regarding local variations in morphology, uniformity and thickness were identified and correlated to reactor configuration and design. A top-down approach was recently investigated to produce aluminum nanoparticles (nAl). Commercial nAl were plasma-treated to reduce the native oxide shell, followed by mixing in an iodic solution (HIO_3) to coat the nAl with an oxidizing salt, aluminum iodate hexahydrate (AIH). Preliminary results suggest that the reactor design with stronger arcing led to increased energy release from the plasma-treated nAl-AIH, presumably due to more efficient arc-induced surface modification and improved nAl-HIO_3 interactions. This paper underscores the importance of recognizing not only the benefits, but also the challenges of applying plasma techniques to novel material production.

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