Experiments of electrical wire explosions (EEW) for nanopowder production were performed on a small-scale pulsed power device, which consists of a low-inductance capacitor bank of 2–4 μF typically charged to 8–25 kV. Titanium wires, 85 mm in length and 175 μm in diameter, were installed inside a discharge chamber filled with 5–50 kPa air. The peak discharge current is about 8–20 kA with a rise time of 6 μs. We investigated the evolution of the exploding titanium wire with a Mach-Zehnder interferometer. From the time sequence of the interferograms, we found that two different modes of wire explosion exist, depending on the ambient gas pressure. As the gas pressure is in the range of 5–20 kPa, more than one vapor burst was observed, which we called multi-burst mode. While the gas pressure is above 40 kPa, the whole wire would explode totally within one single vapor burst, which we called one-burst mode. Based on the calculated deposition energy of the exploding wire and the gas discharge theory, we explained the relationship between the exploding modes and the ambient gas pressure.

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