

Abstract Submitted  
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**Long Particle Chains as Precursors to Ball Lightning?**<sup>1</sup> KARL STEPHAN, Texas State University — While dozens of theories have been proposed to explain the rare atmospheric phenomenon known as ball lightning, few documented experiments have produced something resembling it. An experiment by Cawood (Nature, 124, 150 (1931)) involving electrically charged smoke reliably produced a spherical 20-cm-dia. cloud which consisted of long particle chains. One leading ball lightning theory (Abrahamson and Dinniss, Nature, 403, 519 (2000)) proposed that ball lightning consists of networks of silicon nanoparticles, but failed to specify how these particles would assemble. In experiments involving MgO smoke, we have demonstrated the ability of an electric field to produce long (up to 170 nm) smoke-particle chains, the first step in reproducing the Cawood experiment. The experimental setup used records video of an ultramicroscopic image of particles as they move in response to both gravity and an electric field, and obtains 3-D position data indirectly, allowing estimation of particle mass and mobility.

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Karl Stephan  
Texas State University

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