

Abstract Submitted  
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**Further Investigations of Slow Lightning** KARL STEPHAN, GIL SHELEG, Ingram School of Engineering, Texas State University, San Marcos, TX 78666 USA — The phenomenon of “slow lightning” is a new type of tracking or sliding atmospheric-pressure resistive-barrier discharge on the surface of a weakly conducting electrolyte. It occurs during the production of water plasmoids (also called “Gatchina discharges”) in which a high-voltage capacitor is discharged into an insulated cathode in limited surface contact with the electrolyte. Unlike conventional dielectric-barrier and most other resistive-barrier discharges, these novel discharges propagate on the surface relatively slowly, spreading at a speed of 1-10 meters per second. We have investigated this phenomenon in several ways, using high-speed videography, time- and space-resolved spectroscopy, and current-density profiling. The plasma produced at cathode spots forms the plasmoid, and this plasma is distinct from the plasma in the slow-lightning discharge above the electrolyte. The primary visible emission from the latter discharge is a continuum, probably due to free-bound transitions, although an  $N_2^+$  band is also present as well as intense emission from OH radicals under certain conditions. Possible applications of this phenomenon include water purification and pollution control.

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