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Stern compact layer in ionic conductor liquid charging at high voltages[1] FARZAD MASHAYEK, BABAK KASHIR, ANTHONY E. PERRI, ALEXANDER L. YARIN, University of Illinois at Chicago — The stern compact layer at the conducting electrodes is studied theoretically and numerically. These electrodes are subjected to high voltages and sustain electric current. A novel approach is developed based on the Brunauer-Emmet-Teller (BET) mechanism to predict the thickness of the Stern compact layer. Non-specific (non-electric) adsorption is responsible for the formation of this layer on the oxide islands or impurities at the conducting electrodes. Concurrently, kinetics-limited faradaic reactions occur at the unscreened parts of the metallic conducting electrodes. The electron transfer occurs through the faradaic reactions characterized by the Frumkin-Butler-Volmer kinetics. The model relates the thickness of the Stern compact layer to the potential drop across it. Realistic values of the applied electrode voltage and sustained electric current density in electrostatic atomization are considered to predict the Stern compact layer properties.

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