

EXHIBIT B.04
U.S. Patent No. 7,604,716

References cited herein:

- U.S. Patent No. 7,604,716 (“‘716 Patent”)
- D.V. Mozgrin, *et al*, High-Current Low-Pressure Quasi-Stationary Discharge in a Magnetic Field: Experimental Research, Plasma Physics Reports, Vol. 21, No. 5, 1995 (“Mozgrin”)
- A. A. Kudryavtsev, *et al*, Ionization relaxation in a plasma produced by a pulsed inert-gas discharge, Sov. Phys. Tech. Phys. 28(1), January 1983 (“Kudryavtsev”)
- D.V. Mozgrin, High-Current Low-Pressure Quasi-Stationary Discharge in a Magnetic Field: Experimental Research, Thesis at Moscow Engineering Physics Institute, 1994 (“Mozgrin Thesis”)

Claim 21	Mozgrin in view of Kudryavtsev and the Mozgrin Thesis
<p>14. A method for generating a strongly-ionized plasma, the method comprising:</p>	<p>The combination of Mozgrin with Kudryavtsev discloses a method for generating a strongly-ionized plasma.</p> <p>‘716 Patent at claim 24 (“wherein the peak plasma density of the strongly-ionized plasma is greater than about 10^{12} cm⁻³”)</p> <p>Mozgrin at Fig 1</p> <p>Mozgrin at 400, right col, ¶ 4 (“To study the high-current forms of the discharge, we used two types of devices: a planar magnetron and a system with specifically shaped hollow electrodes.”)</p> <p>Mozgrin at 401, right col, ¶ 2 (“For pre-ionization ... the initial plasma density in the $10^9 - 10^{11}$ cm⁻³ range.”)</p> <p>Mozgrin at 409, left col, ¶ 4 (“The implementation of the high-current magnetron discharge (regime 2) in sputtering ... plasma density (exceeding 2×10^{13} cm⁻³.”)</p> <p>Mozgrin at 409, left col, ¶ 5 (“The high-current diffuse discharge (regime 3) is useful for producing large-volume uniform dense plasmas $n_i \cong 1.5 \times 10^{15}$ cm⁻³ ...”).</p>
<p>a. ionizing a feed gas in a chamber to form a weakly-ionized plasma that substantially eliminates the probability of</p>	<p>The combination of Mozgrin with Kudryavtsev discloses ionizing a feed gas in a chamber to form a weakly-ionized plasma that substantially eliminates the probability of developing an electrical breakdown condition in the chamber.</p> <p>‘716 Patent at 5:14-15 (“The weakly-ionized plasma 232 is also referred to as a pre-ionized plasma.”)</p>

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<p>developing an electrical breakdown condition in the chamber; and</p>	<p>‘716 Patent at claim 23 (“wherein the peak plasma density of the weakly-ionized plasma is less than about 10^{12} cm⁻³”)</p> <p>Mozgrin at Figs. 1, 2, 3, 6, 7</p> <p>Mozgrin at 401, left col, ¶ 1 (“The [plasma] discharge had an annular shape and was adjacent to the cathode.”)</p> <p>Mozgrin at 401, left col, ¶ 4 (“[A]pplying a square voltage pulse to the discharge gap which was filled up with either neutral or pre-ionized gas.”)</p> <p>Mozgrin at 402, right col, ¶2 (“Figure 3 shows typical voltage and current oscillograms.... Part I in the voltage oscillogram represents the voltage of the stationary discharge (pre-ionization stage).”)</p> <p>Mozgrin at 401, right col, ¶2 (“[f]or pre-ionization, we used a stationary magnetron discharge; ... provided the initial plasma density in the $10^9 - 10^{11}$ cm⁻³ range.”)</p> <p>Mozgrin at 400, right col, ¶ 3 (“We investigated the discharge regimes in various gas mixtures at $10^{-3} - 10$ torr...”)</p> <p>Mozgrin at 402, ¶ spanning left and right cols (“We studied the high-current discharge in wide ranges of discharge current...and operating pressure...using various gases (Ar, N₂, SF₆, and H₂) or their mixtures of various composition...”)</p>
<p>b. supplying an electrical pulse across the weakly-ionized plasma that excites atoms in the weakly-ionized plasma, thereby generating a strongly-ionized plasma without developing an electrical breakdown condition in the chamber.</p>	<p>The combination of Mozgrin with Kudryavtsev discloses supplying an electrical pulse across the weakly-ionized plasma that excites atoms in the weakly-ionized plasma, thereby generating a strongly-ionized plasma without developing an electrical breakdown condition in the chamber.</p> <p>‘716 Patent at claim 23 (“wherein the peak plasma density of the weakly-ionized plasma is less than about 10^{12} cm⁻³”)</p> <p>‘716 Patent at claim 24 (“wherein the peak plasma density of the strongly-ionized plasma is greater than about 10^{12} cm⁻³”)</p> <p>Mozgrin at Fig. 1</p>

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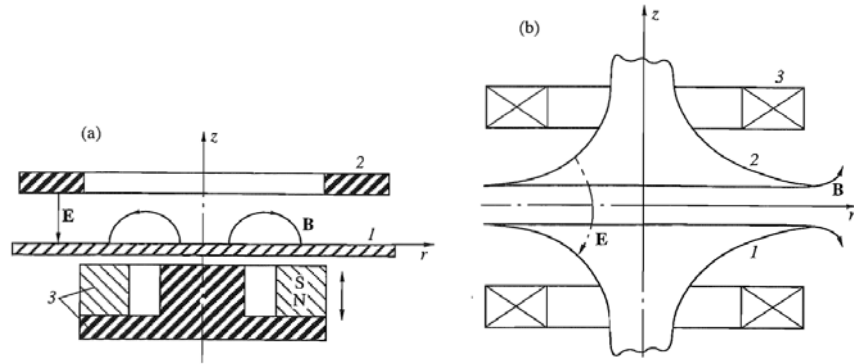


Fig. 1. Discharge device configurations: (a) planar magnetron; (b) shaped-electrode configuration. (1) Cathode; (2) anode; (3) magnetic system.

Mozgrin at Fig. 2

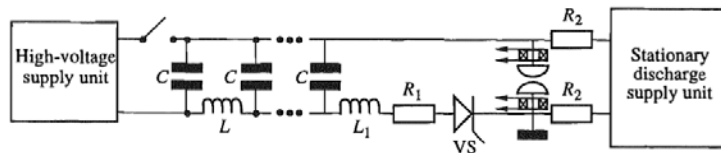


Fig. 2. Discharge supply unit.

Mozgrin at Fig. 3

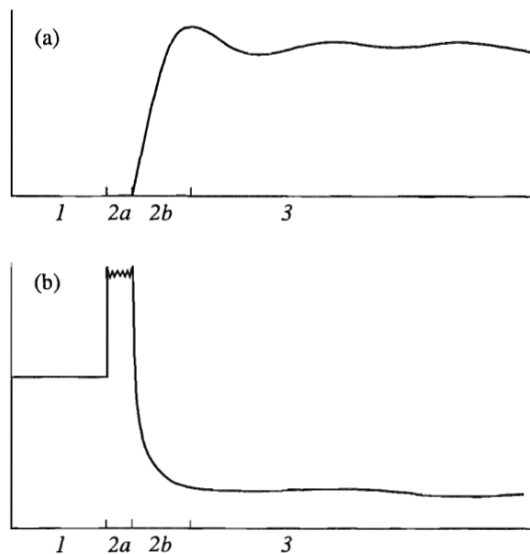
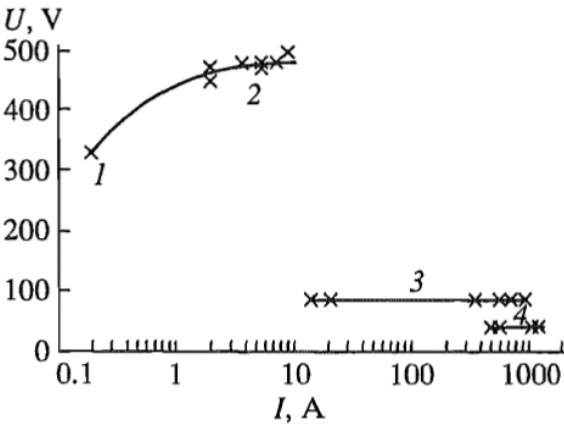
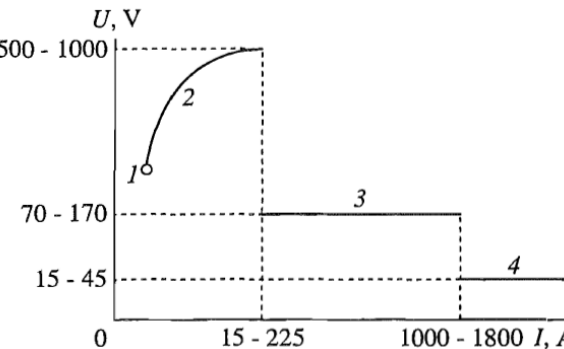


Fig. 3. Oscillograms of (a) current and (b) voltage of the quasi-stationary discharge (50 μ s per div., 180 A per div., 180 V per div.).

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	<p>Mozgrin at 402, right col, ¶ 2 (“Part 1 in the voltage oscillogram represents the voltage of the stationary discharge (pre-ionization stage).”)</p> <p>Mozgrin at 401, right col, ¶2 (“For pre-ionization ... the initial plasma density in the $10^9 - 10^{11} \text{ cm}^{-3}$ range.”)</p> <p>Mozgrin at 401, right col, ¶ 1 (“Thus, the supply unit was made providing square voltage and current pulses with [rise] times (leading edge) of 5 – 60 μs...”).</p> <p>Mozgrin 403, right col, ¶4 (“Regime 2 was characterized by intense cathode sputtering...”) (emphasis added).</p> <p>Mozgrin at 409, left col, ¶ 4 (“The implementation of the high-current magnetron discharge (regime 2) in sputtering ... plasma density (exceeding $2 \times 10^{13} \text{ cm}^{-3}$).”).</p> <p>Mozgrin at 409, left col, ¶5 (“The high-current diffuse discharge (regime 3) is useful for producing large-volume uniform dense plasmas $n_i \cong 1.5 \times 10^{15} \text{ cm}^{-3}$...”).</p> <p>Mozgrin at 400, left col, ¶ 3 (“Some experiments on magnetron systems of various geometry showed that discharge regimes which do not transit to arcs can be obtained even at high currents.”)</p> <p>Mozgrin at 400, right col, ¶ 1 (“A further increase in the discharge currents caused the discharges to transit to the arc regimes...”).</p> <p>Mozgrin at 404, left col, ¶ 3 (“The parameters of the shaped-electrode discharge...transit to arc regime 4, could be well determined... The point of the planar-magnetron discharge transit to the arc regime was determined by discharge voltage and structure changes...”).</p> <p>Mozgrin at 404, left col, ¶ 4 (“If the current was raised above 1.8 kA or the pulse duration was increase to 2 – 10 ms, an instability development and discharge contraction was observed.”).</p> <p>Mozgrin at Fig. 4</p>

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	 <p>Fig. 4. Current-voltage characteristic of the quasi-stationary discharge with shaped electrodes in argon, $p = 0.1$ torr; $B = 0.4$ kG.</p> <p>Mozgrin at Fig. 7</p>  <p>Fig. 7. Generalized ampere-voltaic characteristic CVC of quasi-stationary discharge.</p> <p>Mozgrin at 401, ¶ spanning left and right columns (“Designing the [pulsed supply] unit, we took into account the dependences which had been obtained in [Kudryavtsev] of ionization relaxation on pre-ionization parameters, pressure, and pulse voltage amplitude.”)</p> <p>Kudryavtsev at 34, right col, ¶ 4 (“Since the effects studied in this work are characteristic of ionization whenever a field is suddenly applied to a weakly ionized gas, they must be allowed for when studying emission mechanisms in pulsed gas lasers, gas breakdown, laser sparks, etc.”)</p> <p>Kudryavtsev at Fig. 1</p>

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