

Abstract Submitted  
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**Superhard Coatings Synthesis Assisted by Pulsed Beams of High-Energy Gas Molecules**<sup>1</sup> ALEXANDER METEL, VASILY BOLBUKOV, MARINA VOLOSOVA, SERGEI GRIGORIEV, YURY MELNIK, Moscow State University of Technology “STANKIN”, DEPARTMENT OF HIGH-EFFICIENCY MACHINING TECHNOLOGIES TEAM — For production of nanocomposite superhard (HV 5000) and fracture-tough coatings on dielectric substrates a source of metal atoms accompanied by pulsed beams of 30-keV neutral molecules was used. The source is equipped with two parallel equipotential grids placed between a magnetron target and a substrate. Negative high-voltage pulses applied to the high-transparency grids accelerate from the magnetron plasma ions, which are transformed into high-energy neutral molecules due to charge-exchange collisions with gas molecules between the grids. Mixing of the substrate and coating materials through bombardment by high-energy gas molecules results in an adequate compressive stress of the coating and interface width exceeding 1  $\mu\text{m}$ , which allows deposition of 100- $\mu\text{m}$ -thick coatings with a perfect adhesion.

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