

# Researchers apply diamond coatings to iron and steel tools

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Scientists from Tomsk Polytechnic University (TPU) have created coverings for next-generation cutting tools that are not only durable, but also suitable for the treatment of most materials. They have developed a

technology to produce diamond and cubic boron nitride thin films from a gas mixture.

Due to their hardness, diamond coatings have been widely used in the manufacture of cutting tools. They are used for the treatment of some metal alloys, ceramics and carbon composites, but are ineffective for iron and steel— at high temperatures, carbon interacts with these metals and gradually collapses. To resolve this problem, TPU scientists developed a composite coating based on diamond and cubic boron nitride, the hardest known material. Cubic boron nitride is not destroyed by contact with iron and steel, and makes a tool almost "invulnerable."

Stepan Linnik, a research engineer from the ITPU Institute of High Technology Physics, says, "Nobody has synthesized cubic boron nitride coatings in the form of polycrystalline carbon yet. We want to use the crystal lattice proximity between the substance and diamond. This similarity allows growing cubic boron nitride crystals on diamond crystals. Our [coating](#) that integrates the properties of diamond and nitride coatings, will be applicable to most metals."

The scientists of Tomsk Polytechnic University obtained coatings from gas by means of plasma. University researchers have already developed a diamond sputtering technology from a mixture of methane and hydrogen. Cubic [boron nitride](#) can also be obtained from gas. Thus, the scientists can cover a carbide tool with thin films, increasing its strength.

Provided by Tomsk Polytechnic University

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