

# Physicists create highly efficient rocket fuel

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Scientists at the Faculty of Physics and Engineering, working with the Tomsk company Scientific and Production Center Chemical Technologies, have created and tested an improved model of a hybrid rocket engine. The team synthesized new fuel components that increased its calorie content, and therefore its efficiency.

The development emerged from a project to improve the design of a solid-[fuel](#) hybrid rocket engine and the fuel used in such engines. The scientists mathematically modeled an optimized engine and made fuel compositions based on aluminum diboride and dodecaboride. This is one of the most promising areas increasing [fuel efficiency](#).

Rocket fuel with the addition of the components proposed by TSU specialists is distinguished by the highest calorific value, which characterizes fuel efficiency. Alexander Zhukov, professor at the Department of Mathematical Physics says that boron is the highest-energy solid component known today, but directly introducing it into the fuel is inefficient because a dense oxide film forms, leading to a high degree of burning out. But in combination with aluminum, boron burns well and increases energy.

"What is widely used today in [rocket fuel](#) is not [chemical compounds](#), but, as a rule, a mixture of aluminum and boron. These are completely different things. Our technique for the synthesis of polyborides is quite unique and effective, and it has become one of the main achievements in the course of the project," said Alexander Zhukov. "The materials went through all the necessary research and certification, we calculated the burning rate and calorific value of the resulting fuel, and our partner, Chemical Technologies, mastered the production of these borides and other compounds."

Provided by Tomsk State University

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