



INNOVATING

ENERGETIC MATERIALS

FOR NATIONAL SECURITY

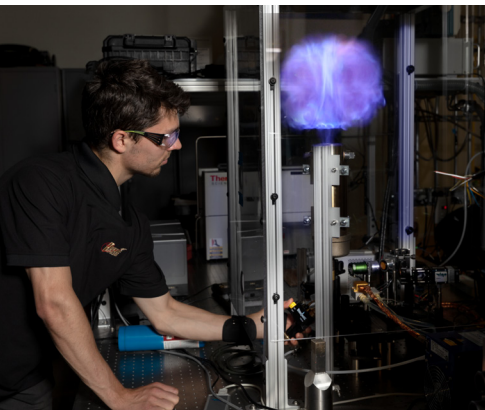
(Purdue University/Susan Fleck Photography)

Purdue leads the nation in the development of superior energetic materials necessary to keep our citizens safe

Advancing energetic materials — the broad category of explosives, propellants and pyrotechnics — is essential to keeping U.S. citizens safe, both at home and on the battlefield, for the foreseeable future. As the nation works to address this critical need, Purdue's energetics expertise, research facilities, and industrial and governmental partnerships will help our nation regain superior technological capabilities.

PURDUE ENERGETICS RESEARCH CENTER (PERC)

PERC is the foremost academic research laboratory in the world focused on energetic materials. PERC's portfolio encompasses basic and applied research related to explosives, propellants, and pyrotechnics, as well as the systems in which they are commonly integrated.

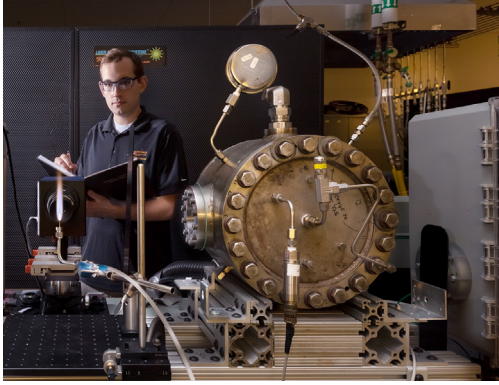


Combustion studies at Purdue University.
(Purdue University/Susan Fleck Photography)

The Center has deep expertise related to the synthesis, formulation, manufacturing, modeling, characterization, performance optimization, and application of energetic materials. This expertise is maintained both in-house and through a network of well-established partnerships, and its start-up ecosystem, which includes a number of notable contractors and serves as a key transition pathway for both PERC and the Department of Defense.

KEY TECHNOLOGY FOCUS AREAS

- Synthesis and formulation of energetic materials
- Machine learning and computer modeling
- Advanced manufacturing
- Energetic material diagnostics and characterization
- Workforce development



Combustion Studies at Purdue University. (Purdue University/Susan Fleck Photography)



Purdue researchers Jeffrey Rhoads and Bryce Geesey examine the surface properties of a mock solid rocket propellant at Purdue University's Ray W. Herrick Laboratories. (Purdue University/Vincent Walter)

CULTIVATING A PIPELINE OF DIVERSE TALENT

PERC educates as many as 150 undergraduate and graduate students in energetic materials at any given time, the largest single source of domestic talent in the field. Adding to the year-round education effort based in PERC is AAMP-UP (Advancing Army Modernization Priorities - Undergraduate Program), a summer undergraduate research program begun in 2021.

- In 2021, Purdue hosted 25 domestic students from nine universities
- Provided experience with experimental and computational energetic materials research
- 10-week program based on a collaboration between the U.S. Army and Purdue to conduct exciting, novel research on energetic materials

FACILITIES

Purdue has unmatched research facilities spread across 8 buildings campus-wide to support comprehensive research. PERC-related research activities take place in several laboratories:

- FLEX Laboratory (primarily synthesis, formulation, and chemical analysis)
- Ray W. Herrick Laboratories (primarily additive manufacturing and mechanical analysis)
- Maurice J. Zucrow Laboratories (primarily formulation, additive manufacturing, combustion, and diagnostics), with smaller laboratories supporting as appropriate.

Collectively, these laboratories represent the most technologically advanced and capable energetic material manufacturing, test, and characterization facilities in academia.



Purdue, U.S. Army Collaborate on Next-Generation Energetic Materials

Purdue's Energetic Research Center has a \$24.7M, 3-year collaborative research agreement with the U.S. Army to help advance energetic materials. The research is conducted jointly with scientists from the U.S. Army, spanning from synthesis to manufacturing to demilitarizing ammunitions and munitions. It also focuses on workforce development and preparing future scientists and engineers in energetic materials research.

(ABOVE) A cooperative research agreement between the U.S. Army and Purdue University's Energetic Research Center will help the Army with its modernization efforts. (Purdue University/Jared Pike)