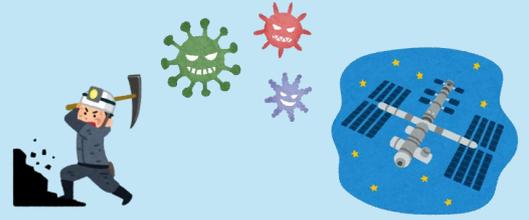


◆ Abstract ◆

We have been developing a hybrid rocket for the past two years. A hybrid rocket uses solid fuel and gas fuel, making it safer and more environmentally friendly than conventional rockets. This project was not only an engineering challenge but also an opportunity for our growth.

◆ Objective ◆

- Explore hybrid rocket technology at the high school level
- Learn through experimentation and collaboration
- Understand why space matters, including resource utilization, medicine development, and scientific exploration



◆ Method ◆

- Igniter changes, fuel shapes, chamber redesign
- Carbon fiber fabrication for strength and lightness
- With Chemistry Club & STEM Research Club

◆ Results ◆

- Built a strong, lightweight carbon fiber rocket body
- Improved design step by step
- Ignition tests still in progress

Wall 1 : Combustion tests

■ fuel

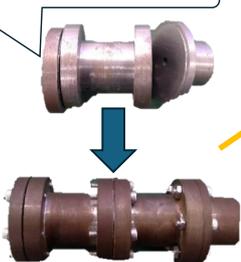
PLA (cylindrical sample)		Slightly burned
PLA (screw-shaped sample)		Slightly burned
Wax and PLA composite		Melted
Wax and carbon composite		Melted
Wax sample		Melted

PLA = Polylactic Acid

■ igniter

Match + paper rag + cellophane tape	
Match + vinyl tape	
Paper + vinyl tape	
Match + paper rag	

Fuel and igniter inside



Combustion test stand

Wall 2 : Making a rocket body



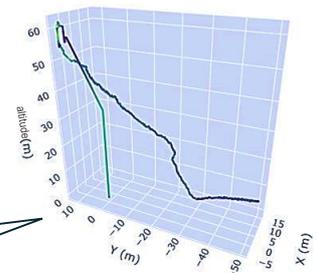
- Cutting carbon fiber straight was difficult.
- Designing a structure that was both lightweight and durable was challenging.
- Achieving ideal properties was tough.

A 3 m Rocket Beside a 170 cm Tall Figure

Wall 3 : Lack of knowledge

Building a hybrid rocket needs **mechanical, electronic, and chemical skills.**

- **C&DH**
→STEM Research Club
- **Chemical**
→Applied Chemistry Club



Express the rocket's altitude

Wall 4 : Mental wall

When experiments failed, we felt stressed and even argued with each other. However, we learned to **support each other and keep going.**

What we learned

The power of **"En"(connections)**: university professors, teachers, friends, and other clubs
Collaboration and communication beyond our school

◆ Conclusion ◆

This journey was more than just building a rocket. It was about teamwork, learning, and personal growth. We will continue to challenge ourselves and aim even higher.