

# TECHNOLOGYProfile

**Technology Domain:** Electrical Engineering

**PRF Reference Number:** 2016-ZIMM-67551

**Technology Readiness Level:** 7

## Carbon Fiber Tubing Heater

There is a need to heat small diameter, flexible, plastic tubing for chemical analysis, environmental sampling, microfluidics, drug discovery, and life science research. Heated tubing must be manufactured to the customer's specified lengths. Due to the difficulty in manufacturing heated tubing, it is presently commercially available to OEM customers only. Present commercially available heated tubing is also expensive to replace when it clogs or becomes contaminated. This is because the heater and tubing are irreversibly integrated into a single assembly. For these reasons, researchers often resort to homemade wraps of nichrome or wrapping heat tapes.

Purdue University researchers have developed a tubing heater that uses a braided carbon fiber sleeve as the heating element. The heater is flexible, inexpensive, and easy to fabricate. The heaters accept tubing from either end by simply sliding it in. The tubing can be easily removed from the heater and replaced. Multiple lengths of tubing can be heated to the same temperature by electrically connecting them in series to a single power supply. This technology opens up the possibility of reasonably priced heated tubing for the laboratory.

### Advantages:

- Flexible
- Simple fabrication
- Less expensive
- Replaceable tubing

### Potential Applications:

- Liquid chromatography
- Chemical analysis
- Environmental sampling
- Microfluidics
- Flow reactors

## Innovator Biography

Mr. James R. Zimmerman is an Instrumentation Specialist at the Amy Instrumentation Facility. Mr. Zimmerman received an A.A.S. and B.S. in Electrical Engineering Technology from Purdue University. His research interests include the design of analog and digital circuitry, design of data acquisition and control systems, design and development of motion control systems, develop and specify electronic laboratory instrumentation, and specialization in temperature control and heating systems.

For additional information, visit Mr. Zimmerman's Purdue website:  
[https://www.chem.purdue.edu/jafci/personnel/zimmerman\\_more.php](https://www.chem.purdue.edu/jafci/personnel/zimmerman_more.php)

or the Amy Instrumentation Facility: <https://www.chem.purdue.edu/jafci/>

