Batteries have, for a number of years, not kept up with the fast development of microelectronic devices. The low energy densities of even the most advanced batteries are a major hindrance to lengthy use of portable consumer electronics, such as laptops, and of military equipment that most soldiers carry with them today. Furthermore, disposing of batteries constitutes an environmental problem. Hydrocarbon fuels exhibit very high energy densities in comparison, and micro-generators converting the stored chemical energy into electrical power at even modest levels, are, therefore, interesting alternatives in many applications. This project focuses on building thermophotovoltaic (TPV) micro-generators, in which photocells convert radiation from a combustion-heated emitter, into electrical power. TPV is an indirect conversion scheme that goes through the thermal domain and therefore, does not exhibit very high efficiencies (10-15% max). However, because of its simple structure and because the combustor and photocell fabrication processes do not need to be integrated, the system is simpler to micro-fabricate than other generator types (e.g. thermoelectric systems and fuel cells). It is also a mechanically passive device that is virtually noiseless and less subject to wear than engines and turbines. In this TPV generator, a catalytic combustor, the suspended micro-reactor (Figure 1) is heated by combustion of propane and air, and the radiation emitted is converted into electrical energy by low-bandgap (GaSb) photocells (Figure 2). Net power production of up to 1 mW has been achieved [1], constituting a promising proof of concept. Work is underway to build a new micro-reactor more suited for the needs of TPV than the original design.

![Figure 1: Suspended micro-reactor for fuel processing and TPV energy conversion.](image1)

![Figure 2: Suspended micro-reactor with photocell in TPV micro-generator configuration.](image2)

**REFERENCES:**