By: Maia Werbos

Fire is dangerous. Even with the best equipment and protocols for extinguishing fires, once something starts to burn, people and property get hurt. And that’s why researchers like Peter Sunderland, professor of Fire Protection Engineering, work on preventing fires.

As an undergraduate, Sunderland always leaned toward engineering, but had many different interests. “Everybody said mechanical engineering was the most general, that you could branch out from there,” Sunderland said. He enjoyed working in that industry for a while, but eventually lost interest in what he was doing. “It wasn’t challenging enough,” he said. Since many of his most successful colleagues had advanced degrees, Sunderland decided to go back to get his Ph.D.

Once he became a graduate student, he realized that academia was right for him — he liked the active, social aspect of academia. “On campus, you’re always interacting with people, all the time...the young people and the students...are so alive and excited and impressionable,” he said.

Sunderland knew he wanted to teach even while he was doing his Ph.D., but he didn’t think he would be able to secure a faculty job until he had more experience as a post-doctorate researcher. According to Sunderland, a faculty job isn’t easy, especially in the first few years. “Universities have found that people straight out of a Ph.D. – they can’t do it,” he said.

Sunderland also waited a little longer to get an offer from a top-notch school. “Early on I had some offers from not as good schools, but when this one came along I was really excited,” he said. He added that the University of Maryland offers a strong fire protection engineering program, which very few United States universities can boast. “This one is the strongest,” Sunderland stated.

Since arriving at Maryland, he has made broad contributions to research. Currently, his largest project is studying soot. “It’s what makes a candle flame yellow instead of blue,” Sunderland explained. It can also be a dangerous contributor to climate change. According to Sunderland, soot is currently the leading source of air-borne pollution in the United States. “It is a much stronger greenhouse gas than methane or CO₂.”

Sunderland takes a different tack to studying soot than many other researchers. Most scientists study the formation of soot. Sunderland, however, prefers to study ways of removing soot. So, his experiments focus on soot oxidization. “We look at how fast it oxidizes; how that depends on temperature, species, and the type of soot,” Sunderland said.

Fire safety is equally paramount for alternative fuels, like hydrogen. Hydrogen fuel cells are a promising source of energy, because burning hydrogen produces mostly water. But they are also widely seen as too risky to use in cars. Sunderland, however, helped make progress on improving safety by studying the flames that could be produced by small leaks in a hydrogen tank.

“A lot of people looked at the big leaks that explode, and that’s something to be concerned about,” he said. “But our idea was, instead of looking at these big explosions...to look at the smallest ones you could have with hydrogen.” The peril of small leaks is that drivers could have small escapes of hydrogen from their car, just enough to burn, that could

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