By **Paul C. Rogge**

My climate change crisis

Reading former Vice President Al Gore's *An Inconvenient Truth* in college awakened me to the widespread threat of climate change. Spurred to action, I joined a lab to develop alternative energy technologies. The result was an undergraduate project studying magnetic materials, which are important for electric vehicles and wind turbines. It got me hooked on research and left me wanting to make a bigger impact. I wanted my work to lead straight to solutions—but in the process, I veered off course.

While visiting prospective graduate programs, I found just the project I was looking for: creating a radically new type of solar cell using low-cost electrochemistry techniques. The chemistry my new project would require was fundamentally different from the methods I had learned while working on magnetic materials, and I hadn't really thought about chemistry since taking Chem 101 as a college freshman. But I was so driven by the potential social impact of the work that these realities did not worry me.

In my first week, it was clear that I was starting from scratch. Mixing my first solution, I dumped powdered copper sulfate into a dry beaker before adding water—a big no-no, as any chemist knows. The extreme heat given off nearly caused the beaker to explode. But I quickly learned the correct procedures and threw myself into my research.

However, 2 years of intense work did not lead to much progress. I found myself in the lab less, and my patience for troubleshooting experiments waned. I began to doubt my project and even my ability to graduate. To my adviser, the unexpected failure of the technique I was using offered a chance to dig deeper into the underlying chemistry. He was excited about what he saw as a silver lining, which made my enthusiasm sink even further. I didn't want to study electrochemistry techniques; I wanted to solve climate change.

In hindsight, the source of my dissatisfaction was clear. In choosing my research area, I had been blinded by my enthusiasm to tackle a pressing social and environmental problem. I hadn't critically considered my own scientific interests and whether I would enjoy working in an electrochemistry lab. I should have remembered how much I struggled in Chem 101. And I should have realized that the concepts and techniques I mastered in my undergraduate research on magnetic materials—the very things that got me hooked on research in the first place—were not particularly relevant for electrochemistry.

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Recognizing I was on the wrong path, I used the nuclear option: switching advisers midway through my Ph.D. While searching for a new adviser, I asked myself which scientific concepts and experimental techniques—the things I would engage with every day—excited me. Perhaps most important, I came to see science as an ecosystem of work ranging from investigating fundamentals to developing devices, all of which contribute to solving pressing problems. I realized I could make a meaningful contribution to combating climate change by working on something I was passionate about, even if it was less directly related to a specific technology.

I found a new home in a lab studying graphene, a material with promising electronic properties. Things clicked and my work took off immediately. There were still some bumps along the way, of course, but I found the day-to-day challenges in the lab less daunting because I was excited by the concepts and techniques I was working with.

Just as I came to see my research as part of a larger scientific ecosystem, today I understand that scientific advancements are just one part of the needed response to climate change. I've reduced my environmental impact by taking public transportation to work, significantly cutting my meat intake, and resisting my consumerist impulses. My lifestyle changes won't single-handedly reverse climate change, and neither will my individual scientific contributions. But we all need to work together to address such challenges, each of us contributing in the best way we can. ■

Paul C. Rogge is a postdoctoral researcher at Drexel University in Philadelphia, Pennsylvania. Send your career story to SciCareerEditor@aaas.org.

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