



Samuel Young: I am a junior in materials science and engineering at Iowa State. From May 26 to August 1, I collaborated with Professors Steve W. Martin from Iowa State University (ISU) and Raúl J. Martin-Palma from the Autonomous University of Madrid (UAM). My research project was dealing with the “Preparation and Characterization of Nanostructured Thin-Film Oxide Materials for New Optoelectronic Applications”.

During my stay in Madrid, I was able to learn a little about nanoporous silicon and make some samples before my material for making thin-films with arrived. These porous silicon samples were made by running current to small pieces of silicon wafer through hydrofluoric acid to etch out holes that look like honeycomb under microscope. At UAM, they are researching the photo-luminescent, electrical, and biocompatibility properties of these surfaces and coating them with things like poly(ethylene glycol) to change these properties and prevent oxidation.

My main project began when powdered GeS₂ and GeO₂ arrived from ISU. I used an electron-beam under vacuum to evaporate these materials onto silicon or glass substrate. I tested the films’ properties using visible and infrared spectroscopy.

Some of my tentative results are that GeS₂ thin films oxidize very quickly; illuminated films oxidize only a little faster; GeS₂ powder suffers from thermal shock as soon as the e-beam hits it and needs to be compressed or melted to work effectively; and also, thickness and rate of deposition of these films is difficult to control using e-beam evaporation.

As for the rest of the trip, Madrid was a nice city with a beautiful “central park” and many fountains and monuments. One cool experience from Madrid was El Rastro, the largest open-air flea market in the Europe, which is held every Sunday. Never having lived in a big city, just being there was a learning experience.

On weekends I visited towns around Madrid, Granada, and also Paris, France with friends I met from my dorm. I highly recommend going to Paris if you are ever nearby.

The biggest thing I can take away from this trip though, was knowledge of Spanish language and culture. I went from not understanding a thing my taxi driver said on the way from the airport to comfortably communicating (at least in simple conversations) by the end.

Overall, my REU internship was a fun learning experience that I will never forget, and I can’t thank Prof. Martin, Prof. Palma, and the IMI at Lehigh University enough for working so hard to make this happen for me.