

RESEARCH STATEMENT

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Research is really what I have been doing for about 20 years. I conducted both fundamental researches for publications and applications at university and institute apply development researches for semiconductor materials and many kinds of semiconductor opto-electronics devices at company and manufacturing. I published over 50 papers in scientific journals on semiconductor materials and devices, did tens of scientific presentations in all kinds of conferences. I received many research grants by myself and did many other grant researches supported by US NASA, DOD, DOE, NIH, etc. I did my master's degree on fundamental research for Mechanism on Luminescent Porous Silicon, as an example on fundamental research. During those days, most of the world had believed that the light emitting from porous silicon was due to the quantum confinement effect. However, I proved it was wrong by my experiment results, and published many papers in journals that helped to clear this out.

My research interests are: 1, Silicon, Germanium, and CdZnTe X-ray, Gamma-ray, and particle semiconductor detectors for National Security and Public Health applications. 2, III-V and II-VI compound semiconductor materials and opto-electronics detectors and lasers.

I possess two USA patents for semiconductor high efficiency Gamma-ray detectors, planning to start from here. I will target my research career in three stages. During the first stage, I will start to prepare grant applications from DOE, DOD, NSF, NIH, national labs, and industries etc. with my patents and proved technologies. I plan to start from semiconductor X-ray, Gamma-ray, and particle detector related applications. I will also try to create my personal academic relationship nationwide with other universities, national labs, and companies. I may even try to establish international relationships with organizations oversea, such as in UK, Germany, France, and China, etc. I will need to get support from the Nano Tech Center at TTU, get the access to use the equipment there and raise all kinds of cooperation with the peoples at the Center.

In the second stage, I will try to win one to three research grants for the Physics Department. I will start my experimental research from conducting semiconductor crystal studies and build up the experimental research results for publications. Along the way, I will present our new experiment results in scientific conferences to make more people know what we are doing in the Physics and Astronomy Department at Texas Tech University and what have been achieved here in Texas. My goal is that we will publish scientific papers, present our newest research results at international conference every year so that when people talk about semiconductor detectors, the Physics and Astronomy Department at Texas Tech University will be bring to their mind. We will try to set up a semiconductor detector test laboratory in the Physics and Astronomy Department at Texas Tech University. I plan to develop our detector at the cleanroom at Nano Tech Center at TTU by using the advanced equipment such as: photolithograph, sputtering, E-beam evaporator, CVD, wet etching bench, etc. We may need to find semiconductor crystals from commercial companies for start with. We could also try to use the facilities in National Laboratory, or some other organizations to fabricate our own detectors if our Nano Tech Center do not has, such as ion implantation, etc.

In the third stage, we will constantly apply for and obtain more grants for our research in Physics and Astronomy Department at Texas Tech University. With that, we could start building our own semiconductor crystal growth laboratory, MOCVD lab, etc. Crystal test laboratory could also be set up with the equipment necessary for achieving crystal characterization. All these we need to cooperate with Nano Tech Center whichever and where the Center could set them up or maintain the costs, at the same time open to all other members at TTU. Sure we will keep on publishing related papers, and present our new experiments in scientific conferences every year. What we will be doing different from most of the research groups in other universities is that we will always target the true practical applications from the very beginning. The detectors developed in our group will be finally sent for true applications for this nation. Yes, we will parallelly work for fundamental research topics on semiconductor materials researches, such as trapping centers in the crystal, carrier transportation properties in the materials, crystal surface properties, the material bend properties, etc.

The final success that I am targeting is to set up our own semiconductor device research and application laboratory for detector fabrication. There, we will have our own electronics group to develop application systems with the core devices developed in our lab by our detector group. We will have our own computer and software specialist group to make special software for our systems, which can be sold to customers across the world. The advance students raised at our laboratory will be able to work and make critical contributions at those famous companies, such as Cree, SanDisk, Micron, Intel, DRS, Raytheon, Lockheed Martin, etc. all over the United States. Although this is still just a dream today, I am confident that if we start seeking now, the dream will be realized in the future not far away.