Statement of purpose

Nice to meet you, professor Daniel J. Jacob. I am Chunhong Xiao, a master of Tongji University, majoring in Environmental Science. I hope to join your group for my Ph.D. study in the fall of 2023. I must tell you very frankly that I like your research very much, but I have little exposure to this area. I have a very strong interest in modeling and programming, but I am a complete beginner in this field. Please forgive my rudeness.

I have learned about the research projects of your team, which mainly focus on particulate matter (particulate nitrate), ozone, methane, hydroxyl radical, peroxyacetylnitrate (PAN), nitrogen oxides (NOx), NH_3, halogens, and volatile organic compounds (VOCs). And I found that the objects may vary, but they are often interrelated and interacting, addressing their chemical processes, influencing factors, source identification, air quality patterns, global trends and distribution, the effects of anthropogenic emissions, emission control strategies, and interactions among different study objects, etc. Meanwhile, the processes of these studies can drive further improvement of software and models, which are two complementary processes. Furthermore, I am curious about background air pollution. The differentiation of background contributions makes the control of local air pollution more targeted and is a very interesting and challenging task for me. I hope that one day it will be probable to eliminate the effects of background pollution through one-click background

deduction in the software interface and to identify sources of background interference, including spatial sources, temporal sources, emission sources, etc.

During my master's degree, I am engaged in the research about rapid detection of carbamate pesticides under the supervision of professor Hong-Wen Gao, who is a very lovely and kind man. We attach more importance to practical application based on the instruments developed in our laboratory, determining the total residues of carbamate pesticides in water by color reaction based on both organic and inorganic experiments. Very small details can cause my experiments to fail. Initially, I prepared the stock solution with acetone and then diluted it one hundred times with distilled water for the following experiments. However, color fading occurred during the color reaction. I kept repeating this experimental process to explore the factors that might cause the phenomenon. But no matter how I changed the experimental conditions, the fading phenomenon still existed. Fortunately, because the stock solution ran out, I tried to use ethanol as the solvent. Given that the solubility of the pesticide in ethanol could not meet the requirements, I proposed the application of a small amount of methylene chloride (a substance that is used for pesticide extraction) and ethanol mixed solution, solving the problem of discoloration.

Before that, the occurrence characteristics of pollutants in air, soil, and

water were the main hotspots in my research. In the second year of my master's degree, I had no choice but to change my supervisor, which led to a change in my research. I am not a lucky person who often needs to fight with life and try to get out of a dilemma. Although I enjoy the current research process, they do not seem to be my interests.

It was a serendipitous process to know you, and I dare to send you an email because of your encouragement and answers to Ph.D. application. At first, I didn't even think about conducting atmospheric chemistry studies, which was a new direction and a big challenge for me. If it is love, then it should never be too late to start. It is you who gives me the courage to try and the strong desire to start. I appreciate your research philosophies and attitudes towards life. I like the atmosphere of your research group. They all have their personalities and lives outside of research. At the same time, they all maintain their passion and purity for research.

I have studied advanced mathematics and linear algebra during college, and I also have a foundation in chemistry, inorganic chemistry, organic chemistry, and biochemistry included. I am sorry that I know relatively little about atmospheric chemistry. During my master's degree, I studied a simulation course for a semester, aiming at simulating the physical field, which also aroused my interest in simulation and modeling. In programming, I have basic Python programming knowledge. In addition, I created a personal academic website based on the template within a week,

even if I do not understand the programming language. When doing this, I was always unconsciously addicted to it. And it is a process that requires patience, which also gives me a new understanding of myself. I believe that it is not an unachievable task for me to have a good grasp of programming skills. My learning ability, perseverance, unyielding spirit, logical thinking ability, and innovative consciousness are all my powerful weapons on the road to scientific research. In summary, I have the confidence, enthusiasm, and courage to enter a new field and achieve breakthroughs.

Scientific research is more like a magnet with an inexplicable attraction to me. I love scientific research and hope to achieve self-worth. For future planning, I want to be a university professor, to shine in the field I like, and to teach in the position I love. My hobbies are dwelling and thinking, and going out to feel the breath of nature. I also like to sing and listen to the hearts of others. Sometimes, I am not confident and confused, but I never change my mind and never forget my dreams. From the beginning to the end, I am the girl who likes to look up at the planes flying in the sky.

Finally, I would like to express my appreciation for you and enthusiasm for your research once again. I have sincerely explained all my circumstances to you and hope to have the opportunity to chat with you. If you think I need to be tested, I would like to spend a year or more to complete all the relevant studies. I will not give up such an opportunity

until you rule out all possibilities. Of course, I respect all your decisions and understand all your concerns.

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