Sino-US Joint Cultivation Model for Postgraduates Majoring in Advanced Energy Materials in BIT

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Keywords: Joint Cultivation, Graduated Students, Advanced Energy Materials, Beijing Institute of Technology.

Abstract. To enhance the development of advanced energy materials in Beijing Institute of Technology (BIT), we are trying to establish a suitable joint cultivation model, for our postgraduates who are willing to carry out international collaboration and expand research horizons. Here, based on a comprehensive understanding of the necessity for joint cultivation in advanced energy materials, we put forward a Sino-US joint cultivation model in advanced energy materials. In addition, some key issues, such as the effect of the orientation before carrying out the experiment, the role of the supervisors in joint cultivation, and the adaptability of postgraduate to new environments, are discussed.

Introduction

In the past 60-odd years, the joint cultivation for postgraduates in China has experienced four stages [1], where the collaboration idea, motivation form and orientation showcase various evolution characteristics and diverse development tendency. After years of development, the training content, the form of communication and the management policy are more and more normative. To implement the strategy of reinvigorating China through human resource development in our country, promote the construction of high-level university, enhance the ability of service for constructing a creative country, the China Scholarship Council set up national professional graduate programs for further internationalization of talents cultivation, which has made many successful cases.

In 2012, the “2011 project”, which is aiming at advancing the innovation capabilities of universities, had been officially launched by the Ministry of Education of the People’s Republic of China. Thus, the implementation of collaborative innovation strategy has set new demands on the innovation and reform of our model and mechanism of joint graduate training [2]. For instance, joint programs in Europe emphasize deep cooperation in program development, teaching, and student administration, and thus has adopted a series of policies and instruments to facilitate and guide the development of the programs [3]. Therefore, to be prepared for participating in such programs, it is necessary to understand the development and policies tendencies concerning joint programs.

In recent years, Beijing Institute of Technology (BIT) has made great progress in the study of overseas joint cultivation of postgraduate students, academic exchange of postgraduate students, and research on overseas cooperation of postgraduate students. There is a strong demand to establish suitable joint cultivation models for postgraduates in different majors.

Necessity for Joint Cultivation in Advanced Energy Materials

The research of green secondary battery and related energy materials in BIT is in the leading domestic and international advanced level. Many of students graduated from BIT have devoted
themselves in energy materials and secondary batteries, and become the decision-makers or key members of some large battery enterprises, standard institutions and industry associations in China. However, the internationalization of our current postgraduate education in advanced energy materials is still needs to be further strengthened. As introduced in the concept of environmental protection cause of non-renewable resources saving and utilization of a new idea of science and technology, new energy development and utilization of new material has been systematically important new energy and renewable energy. New green secondary batteries based on advanced energy materials have shown great potentials and will play important roles for electric energy storage, electric vehicles, small electronic devices, aerospace, and other areas of the national economy. At present, many new idea and technologies in advanced materials emerge in endlessly worldwide. The United States, Europe, Japan, South Korea and some other countries and regions are spending tremendous efforts to improve new energy materials and devices, therefore, international exchanges and cooperation in the field of advanced energy materials has been as a kind of inevitable trend.

The Problems in Joint Cultivation in Advanced Energy Materials

We deeply feel that, in the rapid development of the internationalization of education situation, it is necessary to follow the development trend of the international advanced energy technologies, with top international universities and research institutes. This is an efficient way to improve the level of the postgraduate's foreign language, academic and scientific research, and to further promote international exchanges in the field of advanced energy materials in our university, to cultivate the talents who can adapt to development needs and innovative in the new period. Therefore, in recent years, the green secondary batteries innovation team in BIT has gradually promoting joint training of postgraduates with top research institutions in the world, including Argonne National Laboratory, Lawrence Berkeley National Laboratory and University of California-San Diego. During the joint cultivation process, we are also pondering some of these questions, such as: how to guide students to adapt to the new working environment as soon as possible? How to guide students to look at the treatment difference at home and abroad correctly? How to give full play to the guiding role of Chinese supervisors in the joint cultivation process? How to carry out efficient communication with foreign supervisors? The solution of these problems will help us to establish a joint training mechanism suitable for the advanced energy materials in our university and promote its international development.

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The Effect of the Orientation before Carrying out the Experiment

For the postgraduates in the field of advanced energy materials, except for material synthesis, it is also necessary to apply a variety of electrochemical methods to understand the electrochemical performances, adopt various advanced characterization methods to explore the structure evolutions. Therefore, they must understand the policies of the host institute, and enrich their skills for experiment and safety protection. Orientation education is popular in the US scientific research institutes and universities, which involves the general laboratory safety education, personnel education, fire training, equipment operation training, etc. Found in the process of postgraduate training, laboratory management of the volatile reagent is very strict, deregulation may likely to result in shutdown the whole lab. Some laboratories also suggest that highly toxic chemicals could not be used. In many cases, safety is a top priority for laboratory work. Therefore, we must strictly abide by the requirements of the hosts and carry on research work reasonably and effectively.

The Role of the Supervisors in Joint Cultivation

The affiliations of postgraduate students for joint cultivation are still Beijing Institute of Technology, and the term of joint cultivation is usually about one year. Therefore, the guidance work
of postgraduates is mainly done by domestic tutors. However, during the process of joint training, postgraduate will stay in a foreign laboratory, use the overseas research resources, and therefore must adapt to the humanities environment and the physical environment of the host research team. In this case, how to give play to the role of the Chinese supervisors in the joint training, and can fully arouse the enthusiasm of the foreign supervisors at the same time, make full use of the resources of foreign laboratory to carry out effective research work, is our concern. In this case, it is necessary to avoid the postgraduates deviating from the established research plan to adapt to the foreign laboratory. It is also important to avoid the postgraduates only focusing on their own research plan and ignoring the physical conditions of the host institute.

For timely and effective communication, we established a communication mechanism, where the postgraduate, the domestic supervisor and the foreign supervisor can exchange and discuss academic and daily issues frequently, via teleconferencing or videoconferencing. By this way, we can avoid any misunderstanding in time. The postgraduates are encouraged to put forward possible solution to their research work, which can be evaluated and modified by the bilateral supervisors without delay.

To further enhance the communications between the supervisors, we suggest continuous exchange visits of both sides, which can efficiently promote the comprehensive understanding of each other. At present, the China Scholarship Council has a special program to support the doctoral supervisors whose Ph.D. student is undertaking a joint cultivation program overseas, to visit the student’s host institute or university for months, which is a very useful way to strengthen the collaborations.

**The Adaptability of Postgraduate to New Environments**

In the domestic universities of China, there are always good logistic services, which provide convenient and cheap accommodation for the students. Therefore, it is unnecessary for the students to spend a lot of energy to arrange their everyday life. However, in the United States, postgraduates often need to implement their own accommodations, as well as everyday life. Different universities and institutes differ in the difficulties in solving these problems, because of their local cultures and geographical locations. Therefore, joint trainings of postgraduates in US take various way for solving and arrange their living conditions, spending different time and energy. It is very important to understand the influence of such conditions on postgraduates to carry out their scientific research work, in the hope of concise "strategy" type of experience, as a useful guide for the subsequent joint training of the postgraduates majoring in advanced energy materials.

**Summary**

The student education and training is a core goal of a research university. The Sino-foreign joint cultivation for postgraduates majoring in advanced energy materials in BIT is at the exploration stage. It is of importance to establish a applicative mechanism, for the postgraduates and their domestic and international supervisors to efficiently communicate with each other. By fully understand the differences between the domestic and overseas hosts, and take full advantages of the financial aid policies of the China Scholarship Council, the postgraduates majoring in advanced energy materials are expected to have extensive international view and professional knowledge.

**Acknowledgements**

This research was supported by the the National Basic Research Program of China (Grant No. 2015CB251100), and Key Postgraduates Education and Teaching Project of BIT (No. 2016YJYJG-007).
References

