

## **Master's Program in Applied Chemistry (Electrochemistry)**

### **1. Introduction to Major**

Electrochemistry is a branch of chemistry that studies the transfer process between electric energy and chemical energy, which involves electron transfer between the electrode and the electrolyte or species in solution. Electrochemistry is cutting-edge, interdisciplinary and intimately related to modern science and technology progress. Especially, in 21<sup>st</sup> century, electrochemistry plays important roles for the technology developments in various areas, and has thereafter been developed to be an integrated science branch with quite many sub-branches such as materials electrochemistry, energy electrochemistry, bio-electrochemistry, environmental electrochemistry, semiconducting electrochemistry, microelectronics electrochemistry, organic electrochemistry and corrosion electrochemistry. As a major in engineering university, electrochemistry in Tianjin University has been in a leading role in China in nano- and functional materials, metal electrodeposition and chemical deposition, chemical and physical power sources, electro-catalysis and electro-synthesis.

The research fields include:

- (1) Science and technology of Nanomaterials and functional materials
- (2) Novel high specific energy chemical and physical power sources and supercapacitors
- (3) Preparation science and applications of micro- and nano-devices
- (4) Optoelectronic chemistry of semiconductors
- (5) Metal electrodeposition and chemical deposition, corrosion and protection technology

### **2. Objectives**

The objective is to train high-level scientists and engineers for socialist construction, who are physically and mentally healthy. On one hand, all trained graduates should be loving their motherland of China, supporting basic policies of the Communist Party of China, observing discipline and obeying the law, well-behaved and having strong volition to devote to the socialist construction. On the other hand, they should be skilled and talented in electrochemistry with solid basic theory and systematical specialized knowledge, and of capabilities to be excellent researchers and engineers to take on research and technological projects separately.

### **3. Duration**

The duration for the whole graduate study is three years and the course-learning duration is three semesters (one and a half years).

### **4. Courses and Credit**

Student must complete a total of not less than 27 credit points, in which at least 13 cpts are degree courses, at least 6 cpts compulsory courses, and at least 8 cpts optional ones.

Course Type	Course Code	Course Name	Course Hours	Credit Points	Note
Degree Courses	S131G001	Theory of Marxism	90	3	Not Less Than 13 Cpts
		First Foreign Language	60	2	
	S131GA01	Applied Functional Analysis	40	2	
	S131GA03	Numerical Analysis in Engineering and Science	32	2	
	S207G019	Surface Chemistry of Solid	32	2	
	S210G026	Advanced Inorganic Electrochemistry	32	2	
Compulsory Courses	S207G005	Advances in Electrochemistry	32	2	Not Less Than 6 Cpts
	S207G006	Electrode process kinetics	32	2	
	S207R001	Academic Report		1	
	S207R002	New Experimental Technologies of Modern Chemical Engineering	16	1	
Optional Courses	S207E001	Photoelectrochemistry of Semiconductor	24	1.5	Not Less Than 8 Cpts
	S207E002	Material Electrochemistry	32	2	
	S207E054	Structures and Performances of metals	32	2	
	S207E062	Photoelectrochemistry of Semiconductor	24	1.5	
	S207E087	New Type Functional Materials	24	1.5	
	S207E097	Organic Electrochemistry	24	1.5	
	S210G027	Advanced Organic Electrochemistry	32	2	
	S207E100	New Energy Storage Materials and Solid State Electrochemistry	24	1.5	
	S207E101	Carbon, Carbon materials and Carbon technology	32	2	

### 5. Degree Dissertation

The related work of master degree thesis must be carried out according to the regulations of Tianjin University. The requirements of paper publication during the postgraduate period must be executed according to the related regulations of the school of chemical engineering and technology of TJU.

## Master's Program in Applied Chemistry(Fine Chemicals Engineering

### 1. Introduction to Major

Major in Fine Chemicals Engineering is one important field of applied chemistry discipline. The researches include preparation, separation and purification, and compound commercial products of fine chemicals. It is closely related to the synthetic chemistry, physical chemistry, chemical unit reaction and technology, nanocatalysis of fine chemicals, special chemicals, functional material, chemical and physical cell and its applicants. The most fundamental researches about chemistry will be developed to plant process or commercial products as soon as possible. This major offers the important engineering base of chemical engineering, electron, energy, material, biology, navigation, weapon, environment, information etc.

### 2. Objectives

Learn the fundamental theory of synthetic chemistry, catalytic science, material science as well as understand the discipline development frontier. Master one synthetic or preparation technology about fine chemicals. Know and utilize some experimental skills of fine chemical engineering. Can write scientific research article individually (including in English).

### 3. Duration

Duration: Three years old. Course study: 0.75 year old(one and half terms)

### 4. Courses and Credit

Student must complete a total of not less than 27 credit points, in which at least 13 cpts are degree courses, at least 6 cpts compulsory courses, and at least 8 cpts optional ones.

Course Type	Course Code	Course Name	Course Hours	Credit Points	Note
Degree Courses	S131G001	Theory of Marxism	90	3	Not Less Than 13 Cpts
		First Foreign Language	60	2	
	S131GA03	Numerical Analysis in Engineering and Science	32	2	
	S131GA05	Equations of Mathematical Physics	32	2	
	S207G012	Advanced Organic Synthesis of Fine Chemicals	32	2	
	S207G069	Modern Separating and Analyzing Methods	32	2	

Compulsory Courses	S207R006	Progress in Fine Chemical Engineering	32	2	Not Less Than 6 Cpts
	S207R005	Functional Organic Materials and New Technology	32	2	
	S207R009	Modern Experiments for Fine Chemicals and Engineering	16	1	
	S207R001	Academic Report		1	
Optional Courses	S207E061	Photocatalytic Science and Application of Nanometer Materials	32	2	Not Less Than 8 Cpts
	S207E084	Modern electrochemical methods for power source science	32	2	
	S207E086	New Materials of Power Sources	32	2	
	S207E056	Processing Principals and Techniques of Fine Organic Products	32	2	
	S207E136	Foundation and Application of Pharmacy	32	2	
	S207E119	Electrode Structure and Dynamics for Electrochemical Reactors	32	2	
	S211EP02	Japanese (Second Foreign Language)	32	2	
	S211EP03	German (Second Foreign Language)	32	2	
	S209RC01	Modern Management	32	2	
	S211RC01	Research on Western Innovative Thinking	32	2	
		Other public optional courses			

### 5. Degree Dissertation

According to the decision of the ninth branch academic committee of Tianjin University.