

Materials Science

M.Sc. education program

<http://crei.skoltech.ru/cee/education>

Andriy Zhugayevych

Assistant Professor
Center for Electrochemical Energy Storage

Skoltech

Skolkovo Institute of Science and Technology

Where to get information

Where to look:

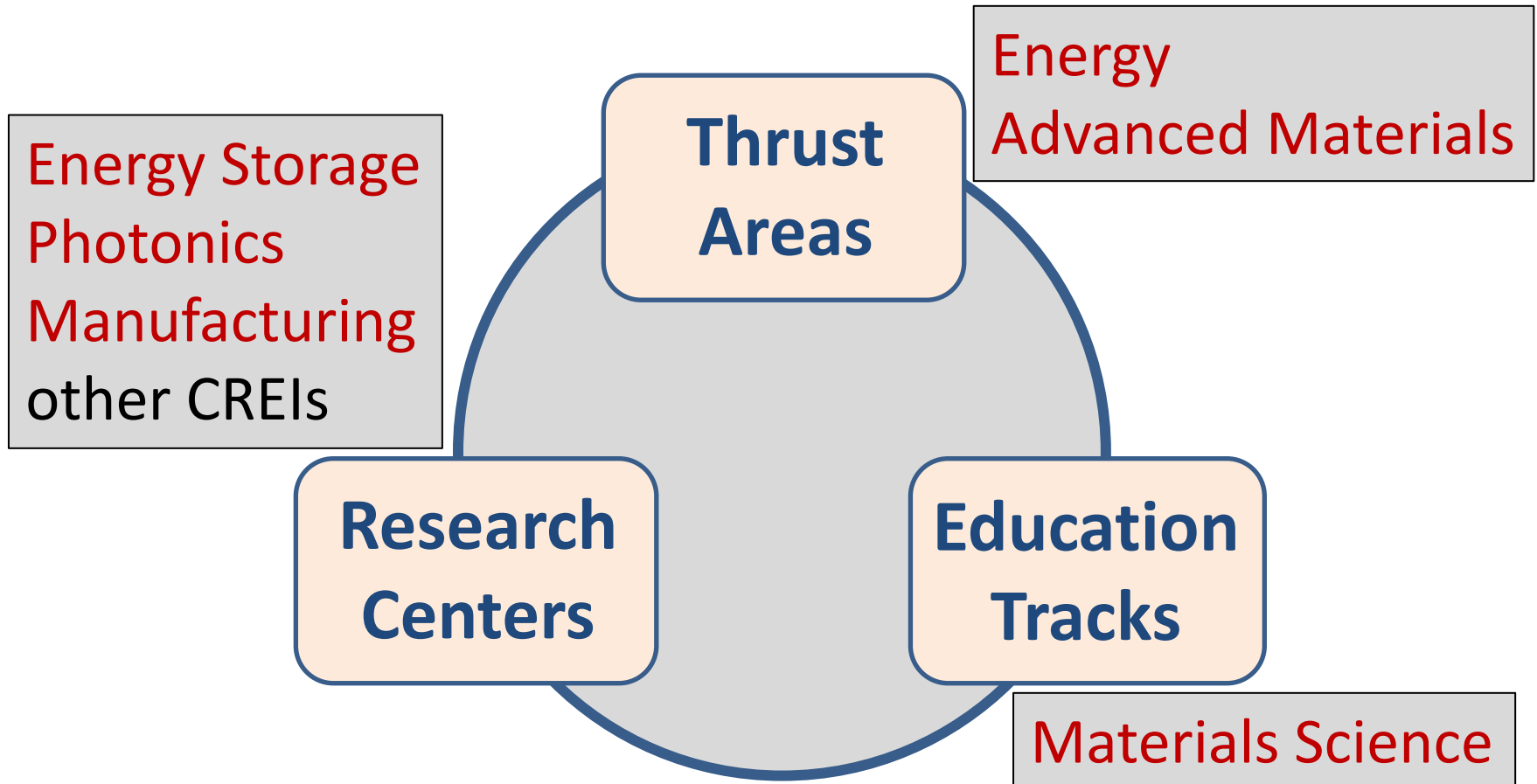
- <http://crei.skoltech.ru/cee/education>

Whom to ask:

- Your academic/research advisor
- Program Coordinator – Andriy Zhugayevych
 - Experimental Materials Science – Artem Abakumov
 - Computational Materials Science – Andriy Zhugayevych

Skoltech research & education environment

- No separate theory or experiment departments
- No separate physics or chemistry departments



Materials Science track: courses

Core courses

- Survey of Materials (**Term 1B**)
- Materials Chemistry (**Term 2**)

Experimental Materials Science

Recommended courses

- Introduction to Solid State Physics(**2**)
- Material Structure Characterization Methods (**3**)
- Organic Materials for Electronics, Energy Conversion and Storage (**3**)
- Electrochemistry (**4**)
- Carbon Nanomaterials (**4**)

Computational Materials Science

Recommended courses

- Computational Chemistry and Materials Modeling (**2**)
- Structure and Property of Materials (**3**)
- Fundamentals of Device Physics (**4**)
- Advanced Solid State Physics (**6**)

Elective courses

- discuss with your advisor

Materials Science track: other activities

Understand your load:

- 1 full course = 20 hours per week (except of Term 1B)
- *Hint*: combine research and education

Seminars (1 hour per week):

- Research Seminar “Advanced Materials Science” – core
- Energy Colloquium – optional
- Computational Materials Science seminar – for subtrack
- Your group seminars – per advisor

Background courses (half-course per term):

- Math for Engineers, Quantum Mechanics (Term 1B!)
- English, Writing, Presentation, Pedagogy

M.Sc. Research in Materials Science

In brief

- *Highly interdisciplinary*
- Materials for energy storage – Abakumov, Antipov, Stevenson
- Materials for optoelectronics – Nasibulin, Troshin
- Computational Materials Science
 - Oganov, Perebeinos, Shapeev, Tretiak, Zhugayevych
- Theoretical Materials Science – Buchachenko, Fine, Skvortsov
- ... with details on faculty web-pages: [example](#)
- Research topics will be covered on Survey of Materials course

M.Sc. Thesis 2016-2018

- Materials for energy conversion and storage (11 students)
- Materials for optoelectronics (3 students)
- Other materials (2 students)

Academic calendar and important deadlines

Academic Year - MSc YEAR 1

27-Aug-18									advisor program II plans								04-Feb-19	11-Feb-19	18-Feb-19	25-Feb-19	04-Mar-19	11-Mar-19	18-Mar-19	25-Mar-19	01-Apr-19	08-Apr-19	15-Apr-19	22-Apr-19	29-Apr-19	06-May-19	13-May-19	20-May-19	27-May-19	03-Jun-19	10-Jun-19	17-Jun-19	24-Jun-19	01-Jul-19	08-Jul-19	15-Jul-19	22-Jul-19	29-Jul-19	05-Aug-19	12-Aug-19	19-Aug-19						
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Core courses																Education, get basic skills																Practice																			

Academic Year - MSc YEAR 2

27-Aug-18	03-Sep-18	10-Sep-18	17-Sep-18	24-Sep-18	01-Oct-18	08-Oct-18	15-Oct-18	22-Oct-18	29-Oct-18	05-Nov-18	12-Nov-18	19-Nov-18	26-Nov-18	03-Dec-18	10-Dec-18	17-Dec-18	24-Dec-18	31-Dec-18	07-Jan-19	14-Jan-19	21-Jan-19	28-Jan-19	04-Feb-19	11-Feb-19	18-Feb-19	25-Feb-19	04-Mar-19	11-Mar-19	18-Mar-19	25-Mar-19	01-Apr-19	08-Apr-19	15-Apr-19	22-Apr-19	29-Apr-19	06-May-19	13-May-19	20-May-19	27-May-19	03-Jun-19	10-Jun-19	17-Jun-19	24-Jun-19	01-Jul-19	08-Jul-19	15-Jul-19	22-Jul-19	29-Jul-19	05-Aug-19	12-Aug-19	19-Aug-19		
project				3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	1	2	3	1	draft				6	7	8	1	2	3	4	5	final				8	1	2	3	4	1	2	3	3	3	3	3	3	
Vacation	TERM 5								TERM 6								Vacation	ISP				TERM 7								TERM 8				Vacation	TERM 8				JUNE				Vacation										
V	C	C	C	C	C	C	E	E	C	C	C	C	C	C	E	E	V	V	C	C	C	C	C	C	C	C	C	E	E	C	C	C	C	C	V	V	C	E	E	MS	MS	MS	MS	V	V	V	V	V	V	V	V		
Thesis research																								Defense																													
KEY.																																																					

KEY:

- Innovation Workshop
- Credit-bearing activity (course, research)
- Evaluation period (assessment and application period)
- Industrial Immersion

- Independent Studies Period
- Vacation
- MSc Thesis Defence

Experimental Materials Science: courses

Experimental Materials Science

Recommended courses

- **Introduction to Solid State Physics (2)**
- **Material Structure Characterization Methods (3)**
- **Organic Materials for Electronics, Energy Conversion and Storage (3)**
- **Electrochemistry (4)**
- **Carbon Nanomaterials (4)**

Elective courses

- discuss with your advisor

Computational Materials Science: courses

Computational Materials Science

Recommended courses

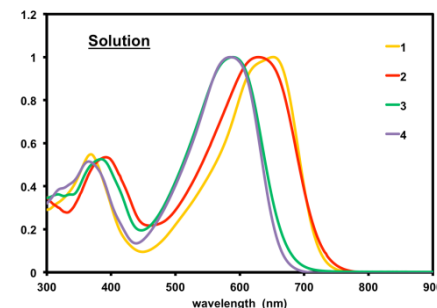
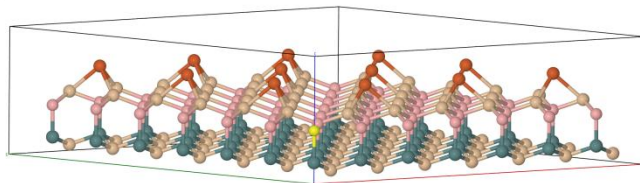
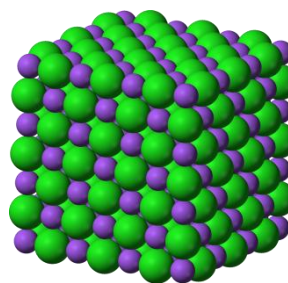
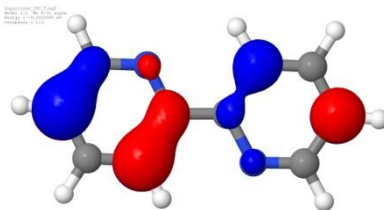
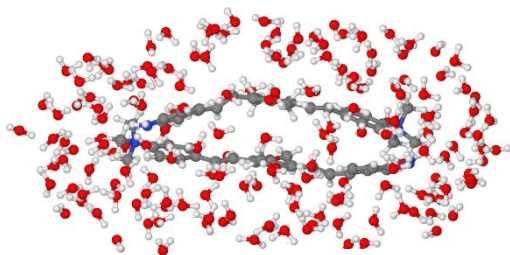
- Computational Chemistry and Materials Modeling (2)
- Structure and Property of Materials (3)
- Fundamentals of Device Physics (4)
- Advanced Solid State Physics (6)

Elective courses

- discuss with your advisor

Computational Chemistry & Materials Modeling

(Sergei Tretiak and Andriy Zhugayevych, Term 2 or 6)



- Whom to attend
 - Everybody who study materials at nanoscale or from first principles, theoretical or experimental
- Learning outcomes (for “beginners”)
 - Minimum knowledge to read scientific articles
 - Minimum set of skills to start first principle materials modeling at any research institution

Other recommended courses

- **Structure and Property of Materials** (Artem Oganov, Term 3 or 7)
 - This course is an introductory subject in the field of materials science and crystallography. The goal is to introduce students to basic concepts of structure-property relations for materials at the microscopic level.
- **Fundamentals of Device Physics** (Vasili Perebeinos, Term 4)
 - The course provides a graduate level overview of physical principles of electronic and optoelectronic devices.
- **Advanced Solid State Physics** (Boris Fine, Term 6 or 2)
 - The course presents an overview of solid-state physics with emphasis on the quantum properties of solids. It covers quantum theory of electronic and lattice degrees of freedom, magnetism and superconductivity, including, in particular, strongly-correlated electronic systems and high-temperature superconductivity.