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| <b>Modulbezeichnung:</b> Molecular Nanoscience I (Nano-1)<br>(Molecular Nanoscience I) |                        | <b>15 ECTS</b>        |
| Modulverantwortliche/r: Andreas Hirsch                                                 |                        |                       |
| Lehrende: Rainer Fink, Franziska Gröhn, Julien Bachmann, Andreas Hirsch                |                        |                       |
| Startsemester: WS 2021/2022                                                            | Dauer: 1 Semester      | Turnus: jährlich (WS) |
| Präsenzzeit: 150 Std.                                                                  | Eigenstudium: 300 Std. | Sprache: Englisch     |

#### Lehrveranstaltungen:

##### 1. Supramolecular Chemistry & Molecular Materials (Seminar 2SWS):

Information/registration: <https://www.studon.fau.de/crs3388402.html>

Supramolecular Chemistry and Molecular Materials (WS 2021/2022, Seminar, Andreas Hirsch et al.)

##### 2. From 2D assemblies to bulk (Lecture 2 SWS):

Information/registration: <https://www.studon.fau.de/crs3369939.html>

From 2D assemblies to bulk (WS 2021/2022, Seminar, Julien Bachmann)

##### 3. Nanoprobes I (Seminar 2SWS):

Information/registration: <https://www.studon.fau.de/crs3436786.html>

Nanoprobes (WS 2021/2022, Seminar, 2 SWS, Rainer Fink)

##### 4. Self-assembly: molecular, particulate and hybrid nanostructures (Lecture 2SWS):

The seminar of "Self-Assembly" is not a compulsory course (for Molecular Nano-Science-students) and can be attended voluntarily!

Self-Assembly: Molecular, Particulate and Hybrid Nanostructures (WS 2021/2022, Vorlesung, 2 SWS, Franziska Gröhn)

Seminar Self-Assembly: Molecular, Particulate and Hybrid Nanostructures (WS 2021/2022, optional, Seminar, 1 SWS, Franziska Gröhn)

##### 5. Molecular Nanoscience (Seminar 2SWS):

Molecular Nano Science (WS 2021/2022, Seminar, 2 SWS, Franziska Gröhn et al.)

#### Inhalt:

- Concepts in supramolecular chemistry; host-guest chemistry; energetics of supramolecular complexes: experimental methods; templates and self-assembly. Molecular devices. Supramolecular catalysis: principles of supramolecular catalysis, supramolecular metal catalysis, self-assembled catalysts, metal-free catalysis, enzyme mimics, antibodies, imprinted polymers.
- Nanoscaled systems, general issues of microscopic techniques; experimental techniques with nanometer resolution: resolution determination; image processing techniques, light microscopic techniques with light in the visible and IR range, confocal techniques, scanning probes (STM, AFM and related scanning probes).
- Specific topics in synthesis and analysis of specific molecule-based nanoscale objects
- 2D film fabrication techniques (PVD, ALD, etc.)

#### Lernziele und Kompetenzen:

The students are capable ...

- to explain the fundamental chemical and physical properties of nano-scale materials
- to distinguish and to compare some properties, structure and applications of different nanomaterials
- to describe and to evaluate the major concepts in supramolecular chemistry, molecular self-assembly and nano-scaled 2D materials and transfer knowledge to related topics
- to judge on potential nano-analytical tools with optimized image contrast

#### Verwendbarkeit des Moduls / Einpassung in den Musterstudienplan:

Das Modul ist im Kontext der folgenden Studienfächer/Vertiefungsrichtungen verwendbar:

##### [1] Molecular Science (Master of Science): ab 1. Semester

(Po-Vers. 2020w | NatFak | Molecular Science (Master of Science) | MolSc Module NANO | Studienrichtung Molecular Nanoscience | Molecular Nanoscience I)

#### Studien-/Prüfungsleistungen:

Molecular Nanoscience I (Prüfungsnummer: 30711)

Prüfungsleistung, mündliche Prüfung, Dauer (in Minuten): 30

Anteil an der Berechnung der Modulnote: 100%

weitere Erläuterungen:

O30(PL): Oral examination (30 minutes) or alternative examination according to the FAU Corona Statutes!

Prüfungssprache: Englisch

Erstablingung: WS 2021/2022, 1. Wdh.: SS 2022

1. Prüfer: Nano-II (N70015)

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### Organisatorisches:

Please note:

- **Molecular Nanoscience I (Nano-1)** is taught in winter term only! Please note:
- Students have to register for the module (check registration period on MeinCampus)!
- Registration/further information via StudOn: see lectures in UnivIS!

1) <https://www.studon.fau.de/crs3388402.html>

2) <https://www.studon.fau.de/crs3369939.html>

3) <https://www.studon.fau.de/crs3436786.html>

4) <https://www.studon.fau.de/crs3291362.html>

5) <https://www.studon.fau.de/crs2762707.html>

### Bemerkungen:

This module represents one out of two lecture modules within the **Core Module "Molecular Nanoscience"** within the M.Sc. degree programme Molecular Science: Molecular Nanoscience I (only in winter term) + II (only in summer term)