



TECHNISCHE  
UNIVERSITÄT  
DARMSTADT



## Master Thesis

### Digital Lab-Book for CNT Separation

**Motivation:** The varied, tailorable and diameter dependent optical properties of carbon nanotubes (CNTs) make them attractive for use in next generation photodetectors, sensors and solar cells. However, in order to realize these end-use applications, the raw CNT powder must be purified in order to obtain CNTs with defined properties.



**Aim:** This master thesis will develop a digital lab-book for the aqueous two phase extraction (ATPE) of single chiral CNTs, which will be used in recipe driven separations of CNT raw materials. ATPE is reliant upon aqueous solutions of polyethylene glycol (PEG) and dextran (DX) and the separation of CNTs is sensitively related to the different solvation energy of these in the two phases which is controlled by their surfactant coating. This results in a multidimensional/component space that needs to be carefully controlled in order to obtain a certain target CNT species. Once developed, the digital lab-book will be used to assist the separation of new large diameter CNT species.

**Task:** You will learn and use instruments and methods to separate single chiral CNT species. You will read literature, analyze and present your data, carry out scientific writing and you will be exposed to optical spectroscopy. It is expected that 50 % of your time will be assigned to the programming of a digital labbook and 50% to the ATPE of CNTs.

**Interested?:** Highly motivated candidates can send their application (CV, full academic transcript, BSc thesis) to [benjamin.flavel@kit.edu](mailto:benjamin.flavel@kit.edu). Expert knowledge in python is desirable and an English C1 level is required. The workplace is at the Institute of Nanotechnology near Karlsruhe, info at [www.int.kit.edu/krupke-group](http://www.int.kit.edu/krupke-group). For TU Darmstadt students, the work counts as an internal master thesis. Thesis guidelines at [bit.ly/3nir67A](https://bit.ly/3nir67A)