# TRR 80 Sonderseminar

Am Donnerstag, den 3. November um 13:30 Uhr

spricht

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über das Thema

## *Synthesis, Growth and Characterization of Fe-based Superconductors*

The discovery of high-temperature superconductivity in the ZrCuSiAs type rare-earth oxypnictide LaFeAsO (F-doped) with $T_c$ of 26 K [1] has created strong interest in the exploration of iron-based superconductors [2,3].
So far, five different structure classes of Fe-based-superconductors have been found [2]. Irrespective of the structure-type, the common feature in all Fe-based-superconductors, is the presence of layered structure based on a plane layer of Fe atoms joined by tetrahedrally coordinated pnictogen (P, As) or chalcogen (S, Se and Te) anions. The latter are arranged in a stacked sequence separated by alkali, alkaline-earth or rare-earth and oxygen/fluorine layers.
Due to toxicity and high vapor pressure of arsenic, phosphorous and selenium elements and the high reactivity of rare-earth, alkali and alkaline-earth metals, the synthesis of these compounds is more difficult than that of cuprates. In order to understand the intrinsic properties of the Fe-based-superconductors, systematic investigations of, sizable, high quality single crystals are indispensable.
There are several ways to grow crystals of Fe-based superconductors. The $AFe_2As_2$ ($A$ = Ba, Ca, Sr and Eu) compounds can be grown in single crystalline form by high-temperature solution growth method using either a Fe-As self-flux or a Sn flux [4]. However, the incorporation of the flux results in some cases to the decrease of the structural/magnetic transition in the latter compounds. The growth of large single crystals of the 1111-system has been proven to be difficult. High pressure growth has been more successful in growing larger crystals from salt flux and it has been shown to be more effective for F-doping [5].
Despite the structural simplicity of FeSe among the Fe-based-compounds, crystal growth of this compound is very challenging taking into account the different polymorphs and the extreme sensitivity of superconductivity to small deviations depending on the elemental composition, synthesis process and synthesis conditions of temperature or pressure [6].
In this contribution I would like to emphasize mainly the synthesis and crystal growth activity of FeAs-based 11-, and 1111-type compounds in Frankfurt.

Gäste sind herzlich willkommen.
Der Vortrag findet im Seminarraum 403/S, Physik-Gebäude Süd, Universität Augsburg statt.

Gastgeber: Dr. Joachim Deisenhofer