

# Monash Centre for Electron Microscopy Seminar

## **Atomic Resolution Microscopy of Clathrates**



MONDAY 1 OCTOBER, 2018



11.00AM



Lecture Theatre S13  
11 Raionforest Walk  
Monash University Clayton Campus

Presenter

**Dr Reiner Ramlau**

Max Planck Institute for Chemical Physics of  
Solids  
Dresden, Germany

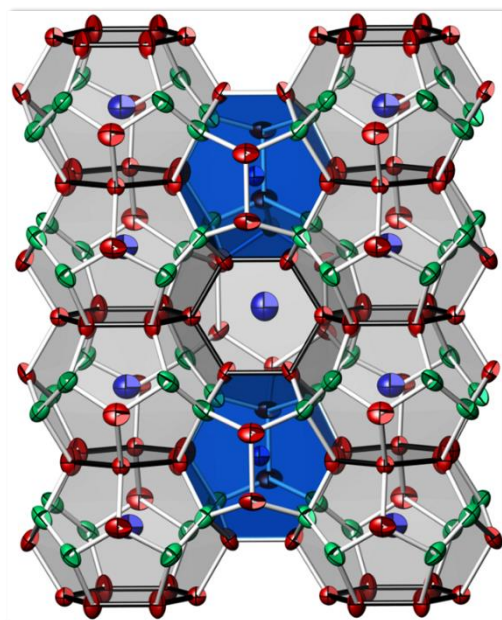
The talk presents the Dresden Grand Atomic Resolution Microscope (ARM), the JEM-ARM300F with double CS-correction. The instrument is – at the moment – the second best electron microscope in Germany with respect to resolution power. It is the only instrument of this class in Germany which is equipped with JEOL's proprietary asymmetric dodecapole correctors, sometimes also called ETA corrector (Expanding Trajectory Aberration corrector), and with JEOL's COSMO system (JEOL Corrector System Module) for auto control of the aberration correctors. Advantages and disadvantages of this exclusive situation are described. The principle of aberration correction is shortly summarized.

A virtual tour is given throughout the lab building with the focus on the installation requirements that had to be satisfied.

Among the many clathrates investigated in the Department of Chemical Metal Science (Prof. Yuri Grin) the talk is limited to the clathrates-I whose structure (and importance) is explained in detail.

TEM and STEM results are shown for clathrate-I borosilicides with potassium and rubidium as guest species as well as for defect clathrates-I like barium germanium auride:  $(K,Rb)_7B_7Si_{39}$  and  $Ba_8AuxGe_{46-x-y}\square_y$ , respectively ( $\square$  = vacancy). The discussion comprises the occupancy of potassium and rubidium at the guest sites inside the small and large cages of the borosilicides, imaging of boron at the host framework, disorder and symmetry descent of the defect clathrates and the localization of gold in the germanium auride host-framework.

The suitability of clathrates-I for ultimate resolution tests is demonstrated.



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