

The two new Atomic Resolution Microscopes JEM-ARM200F at the Stuttgart Center For Electron Microscopy (StEM) at the Max Planck Institutes in Stuttgart

StAR-M 2014 – Stuttgart Atomic Resolution Microscopy Symposium was held on the 15th and 16th of December 2014 at the Max Planck Institute (MPI) for Solid State Research and the MPI for Intelligent Systems in Stuttgart, Germany. The commemorative event was in conjunction with the Inauguration Ceremony celebrating the installation of two new JEOL JEM-ARM 200F TEMs at the Stuttgart Center for Electron Microscopy.

The aim of the symposium was to bring together experts in all the fields of electron microscopy touched by aberration-correction and to encourage them to discuss whatever area of their research was to them most exciting, most recent, or most intriguing. It was hoped that bringing these ideas together, not forgetting the perspectives of the audience, would inspire new directions, new solutions as well as new and interesting research questions for all participants.

The impressive event opened with a champagne reception on Monday morning where the guests and the speakers gathered. The conversation was warm and lively as friends greeted each other and new faces were welcomed. This set the tone for the rest of the two day symposium; the conversations continued, even late into the night on Monday for a few night owls.



Fig. 1: P.A. van Aken opens the Stuttgart Atomic Resolution Microscopy Symposium



Fig. 2: The symposium was attended by more than 200 participants.

The address of welcome of the Inauguration Ceremony by Prof. Dr. P. A. van Aken was followed by many kind words of congratulation by the Managing Directors of the MPI for Intelligent Systems, Prof. Dr. J. Spatz, and the MPI for Solid State Research, Prof. Dr. B. Keimer, and of Prof. Dr. M. Rühle, Emeritus Scientific Member of the Max Planck Institute for Intelligent Systems, on the installation of the new TEMs. Some of the results that have already been achieved at StEM with the new TEMs were presented and their acquisition and scientific potential was placed in context within the history and development of TEM at MPI-IS. StEM was honoured by the attendance of the Vice President of JEOL Ltd., Dr. M. Iwatsuki. He added his good wishes for the future, and emphasized the many productive collaborations JEOL has with the StEM group and indeed many other EM research groups, which lead to the continuous improvement of their TEM instruments and the research output achievable.

The scientific sessions began with two lectures on instrument development, focusing on recent efforts and results in aberration correction at JEOL and at CEOS. Then dynamic TEM and the remarkable experiments that can be performed in-situ, including live viewing of electro-chemical reactions, were presented. During the lunch break the first tours of the new TEM labs at StEM were held. Many guests took advantage of the opportunity to see the new instruments in action, and StEM researchers were eager to show off their new toys. The scientific sessions on Monday afternoon focused on low-dimensional materials, with four talks, followed by talks on quantitative STEM and multiple-scattering-assisted EM.



Fig. 3: The participants were inspired by excellent invited speakers.



Fig. 4: Fascinated guests during a demonstration of the new TEMs.

On Monday night the conference dinner was held; it was a gala dinner put on by JEOL to really celebrate the occasion. Excellent food, kind service, and a live band made the evening relaxing and entertaining. Many guests stayed late into the night, to dance in front of the stage surrounded by the music or to talk in the dining room with the tunes providing a quieter background soundtrack.

The scientific sessions continued for a full day on Tuesday. In the morning there were discussions of plasmons and cathodoluminescence. Quantitative atomically resolved EDS was explored, before two talks on electron vortices and magnetic chiral dichroism. After lunch several innovative techniques for producing and exploring fields in the TEM were explained. Leading edge experimental techniques for producing specific fields around a specimen in the TEM and highly developed software analysis routines for visualizing fields, capable of running at the speed of in-situ experiments, were described and their impressive results shown.

In the final session the audience was treated to two talks on the variety and value of the information given by atomically resolved (S)TEM imaging and analysis on specific materials. The necessity of this type of data to the development of functional oxide materials was explained, with additional discussion of ways the data could be further improved by specific instrument developments. And the closing topic was the contribution of new atomically resolved imaging capabilities to the old problem of making stronger, harder steel.



Fig. 5: A group picture of the invited speakers.

The StAR-M 2014 symposium was a great success. An excellent group of invited speakers came together to discuss all the variety of techniques available for examining materials with aberration-corrected (S)TEM. Exciting, recent, and fascinating research questions were indeed discussed. The guests were informed and entertained and went away with new inspiration for getting the best data from their own electron microscopy experiments. StEM was very happy to receive and very appreciative of all the genuinely expressed good wishes for productive and innovative research to be carried out on the two new TEMs.

The procurement of the two new JEOL JEM-ARM 200F transmission electron microscopes was entirely funded through the Max Planck Society.