

MM 5: HV Dunin-Borkowski

Time: Monday 14:00–14:30

Location: IFW A

Invited Talk

MM 5.1 Mon 14:00 IFW A

In situ transmission electron microscopy of growth processes and chemical reactions — TAKESHI KASAMA¹, JÖRG R. JINSCHKE², THOMAS W. HANSEN¹, JAKOB B. WAGNER¹, ZI-AN LI³, MICHAEL FARLE³, and ●RAFAL E. DUNIN-BORKOWSKI¹ — ¹Center for Electron Nanoscopy, Technical University of Denmark, DK-2800 Kongens Lyngby, Denmark — ²FEI Europe, Achtseweg Noord 5, 5600 KA Eindhoven, The Netherlands — ³Universität Duisburg-Essen, Lotharstr.1, 47048 Duisburg, Germany

Modern environmental transmission electron microscopes (ETEMs) can be equipped with aberration correctors and monochromators to improve spatial resolution and spectral sensitivity during dynamic studies of chemical reactions and growth processes. We have recently installed

an FEI Titan 80-300 ETEM, in which seven different gases can be introduced into the microscope at pressures of up to 1500 Pa and additional gases can be connected when required. As a model system, we have chosen to study Au nanoparticles on BN, graphene and silica supports in oxidizing and reducing environments at elevated temperature. The particles are observed to sinter both by migration and coalescence and by Ostwald ripening, with different sintering mechanisms occurring simultaneously. We have also recently used ETEM to study the reduction of single crystalline 15 nm Fe oxide cubes to Fe at elevated temperature in hydrogen in the electron microscope, and their subsequent reoxidation to polycrystalline Fe oxide in the electron beam. I will discuss the degree to which both sets of experiments may be affected by ionization of the gas and charging of the specimen.