



## Breaking Barriers in Oxide Nanoelectronics: Advancements in *In Situ/Operando* TEM Studies

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Transmission electron microscopy (TEM) studies of nanoelectronic devices (such as memristors) present an invaluable opportunity to enhance our understanding of their functionality, which could ultimately lead to significant improvements in their performance. However, their structure-property correlations may be obscured when the devices are not under the influence of external stimuli. Prof. Molina-Luna will present the advancements he has made in *in situ* and *operando* approaches in the TEM which were developed in close collaboration with industry developing dedicated TEM sample holders. His research group at TU Darmstadt made significant contributions to the field of *operando* electrical testing in the TEM requiring the development of sophisticated sample preparation routines to maintain functionality of the devices while being thinned down to electron transparency. After handling this significant obstacle, the future work will focus on advanced TEM techniques (such as 4D-STEM and electron beam induced current (EBIC)) including machine learning, with the objective to identify the optimal design of these *in situ/operando* experiments.

CRC 1461: Neurotronics  
Colloquium: 26-September-2024\_31  
Thursday, **9:30 am to 11:30 am** (CET)  
The colloquium will start at **10:00 am**  
[Link to the zoom meeting](#)

Invited by Ole Gronenberg, referral by Lorenz Kienle  
Kiel University, Faculty of Engineering