

## Supplemental Document

### ATOMIC LAYER DEPOSITION OF HAFNIUM OXIDE ON INAS: INSIGHT FROM TIME-RESOLVED IN SITU STUDIES

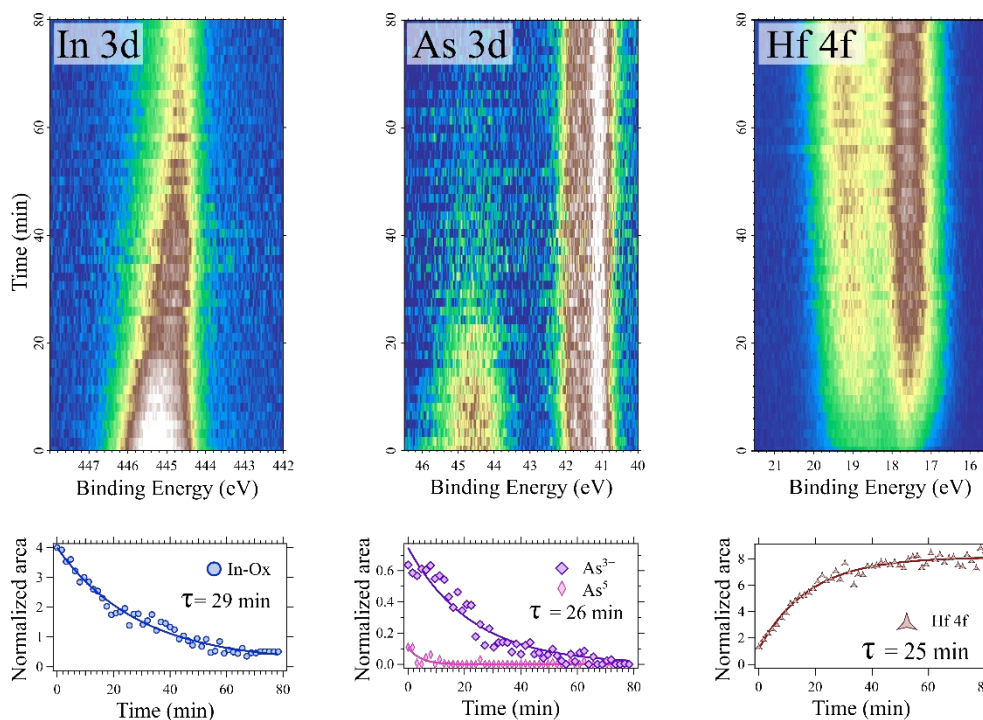
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Ambient pressure X-ray photoemission spectroscopy (AP-XPS) papers:

- S. Zhu, et al. - "HIPPIE: a new platform for ambient-pressure X-ray photoelectron spectroscopy at the MAX IV Laboratory" - J. Synchrotron Rad. (2021). 28, 624-636
- E. Kokkonen, et al. - "Upgrade of the SPECIES beamline at the MAX IV Laboratory" - J. Synchrotron Rad. (2021). 28, 588-601

Atomic Layer Deposition papers:

- G. D'Acunto, et al. - "Atomic Layer Deposition of Hafnium Oxide on InAs: Insight from Time-Resolved in Situ Studies" - ACS Appl. Electron. Mater. (2020), 2, 12, 3915–3922
- R. Timm, et al. - "Self-cleaning and surface chemical reactions during hafnium dioxide atomic layer deposition on indium arsenide" - Nat Commun 9, 1412 (2018)



Time-resolved APXPS data measured during the exposure of InAs(100) to TDMA-Hf at  $\sim 10^{-4}$  mbar. The top row shows the In 3d, As 3d and Hf 4f data recorded during the deposition. (left) In 3d, with In-As component at 445 eV and In-O component at 446 eV. (middle) As 3d, with As-In component at 41.0 eV and As-O component at 44.5 eV. (right) Hf 4f and In 4d, overlapping in energy. The bottom row shows the evolution of the different intensities and their exponential time constants. Photon energy was 650 eV. Adapted from [D'Acunto et al., ACS Appl. Electron. Mater. (2020)]