Examples of Disentangling Autoencoders

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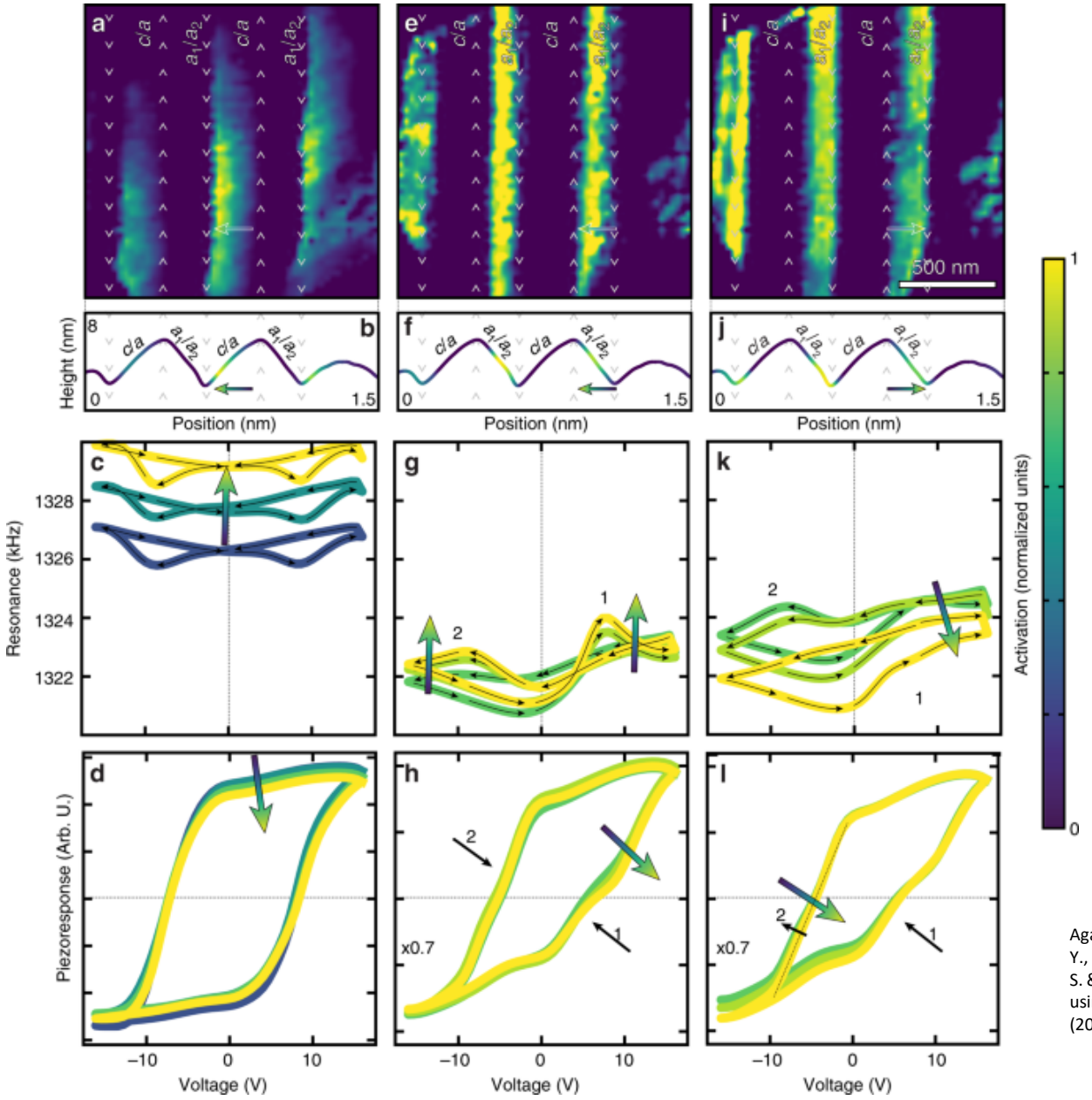
Friday, September 8, 2023

Ferroelectric Switching with L1 Regularization



Agar, J. C., Naul, B., Pandya, S., van der Walt, S., Maher, J., Ren, Y., Chen, L.-Q., Kalinin, S. V., Vasudevan, R. K., Cao, Y., Bloom, J. S. & Martin, L. W. Revealing ferroelectric switching character using deep recurrent neural networks. *Nat. Commun.* **10,** 4809 (2019). doi:10.1038/s41467-019-12750-0

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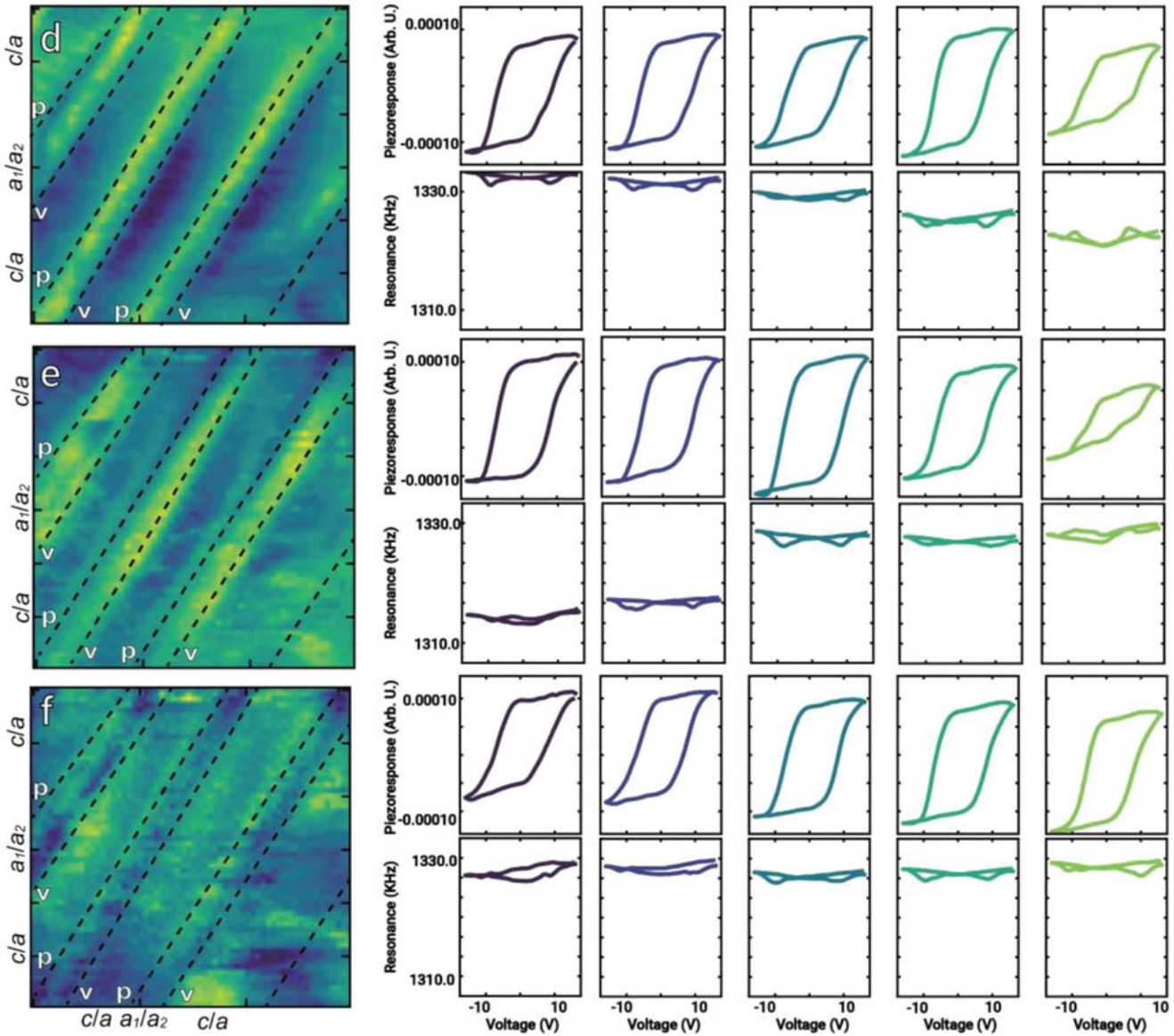
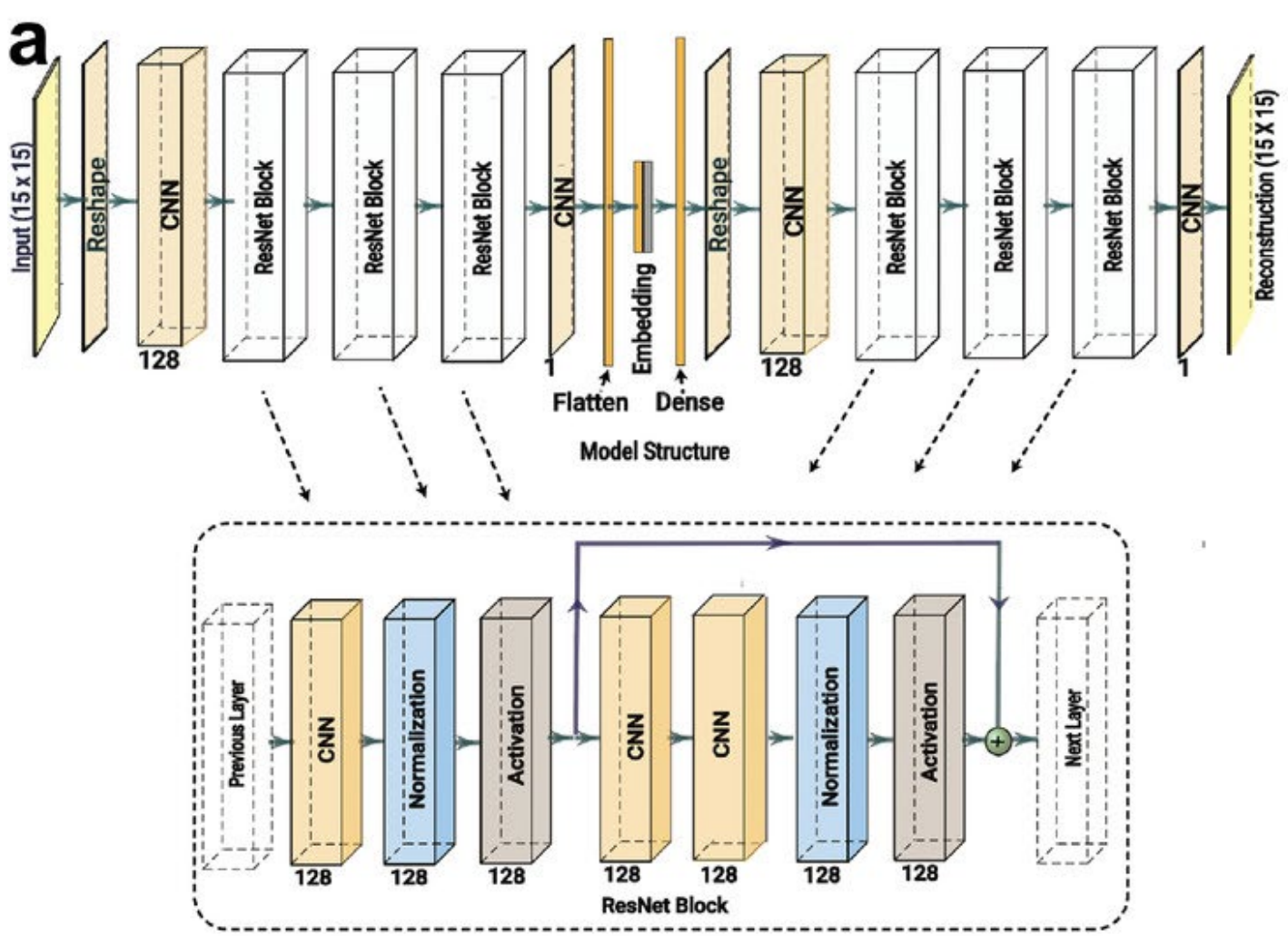
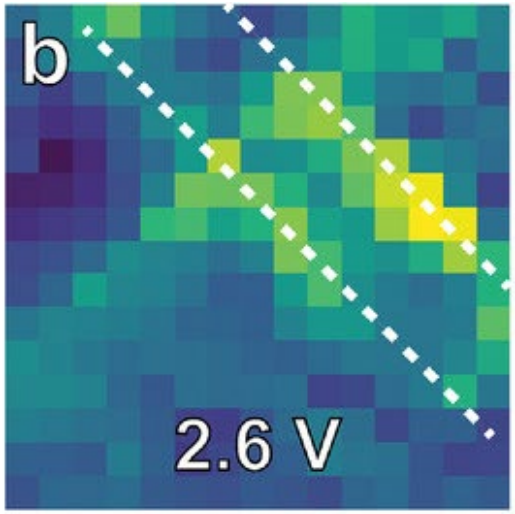
β Variational Autoencoders

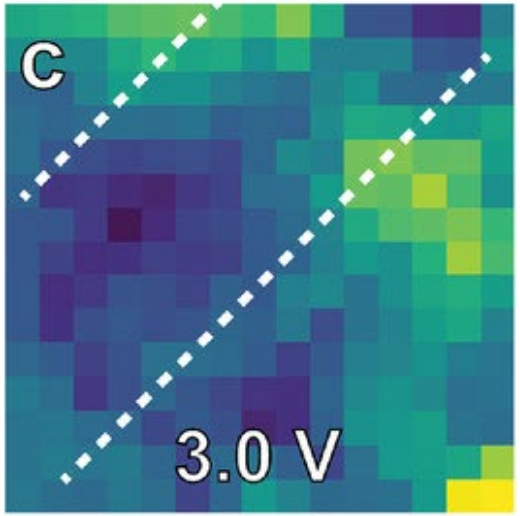


Qin, S., Guo, Y., Kaliyev, A. T. & Agar, J. C. Why it is Unfortunate that Linear Machine Learning 'Works' so well in Electromechanical Switching of Ferroelectric Thin Films. Adv. Mater. e2202814 (2022). doi:10.1002/adma.202202814 doi:10.1002/adma.202202814

Watching Ferroelectric Switching







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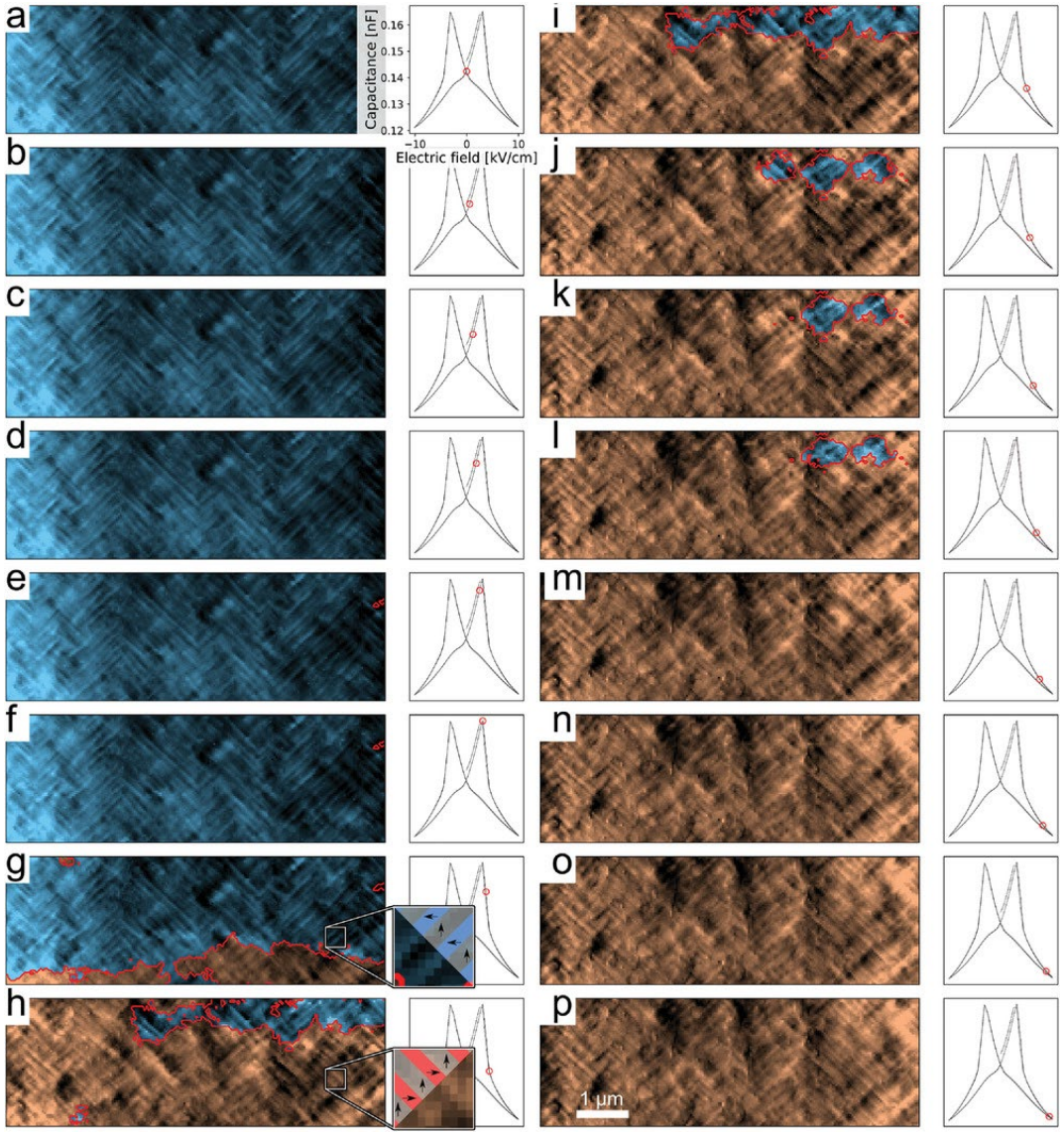
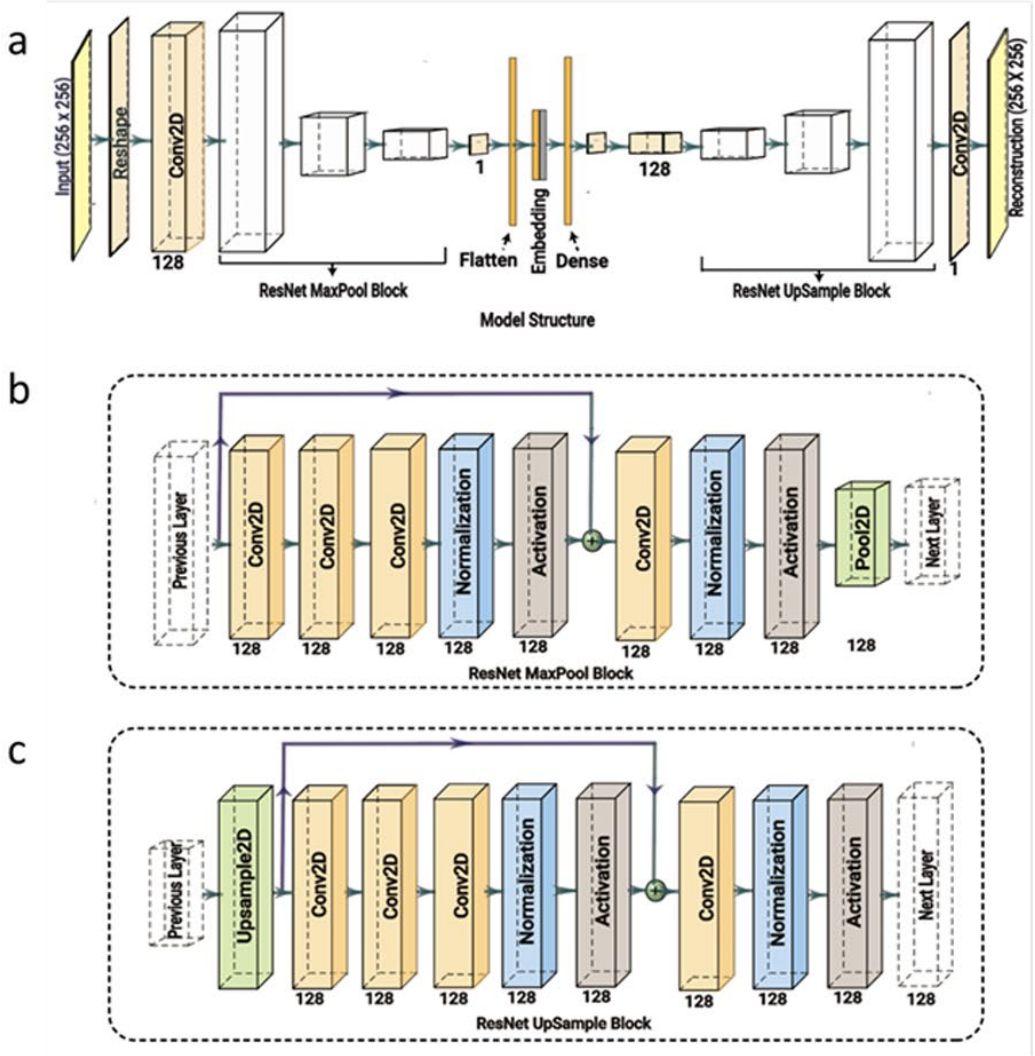
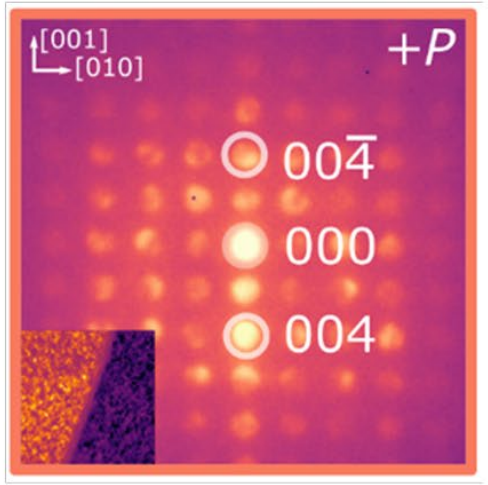
Watching Ferroelectric Switching

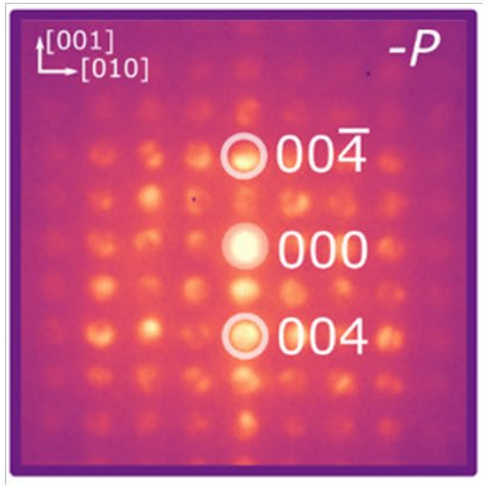


Raeder, T. M., Qin, S., Zachman, M. J., Vasudevan, R. K., Grande, T. & Agar, J. C. High velocity, low-voltage collective in-plane switching in (100) BaTiO3 thin films. *Adv. Sci.* **9,** e2201530 (2022). doi:10.1002/advs.202201530

Domain Detection in 4D STEM







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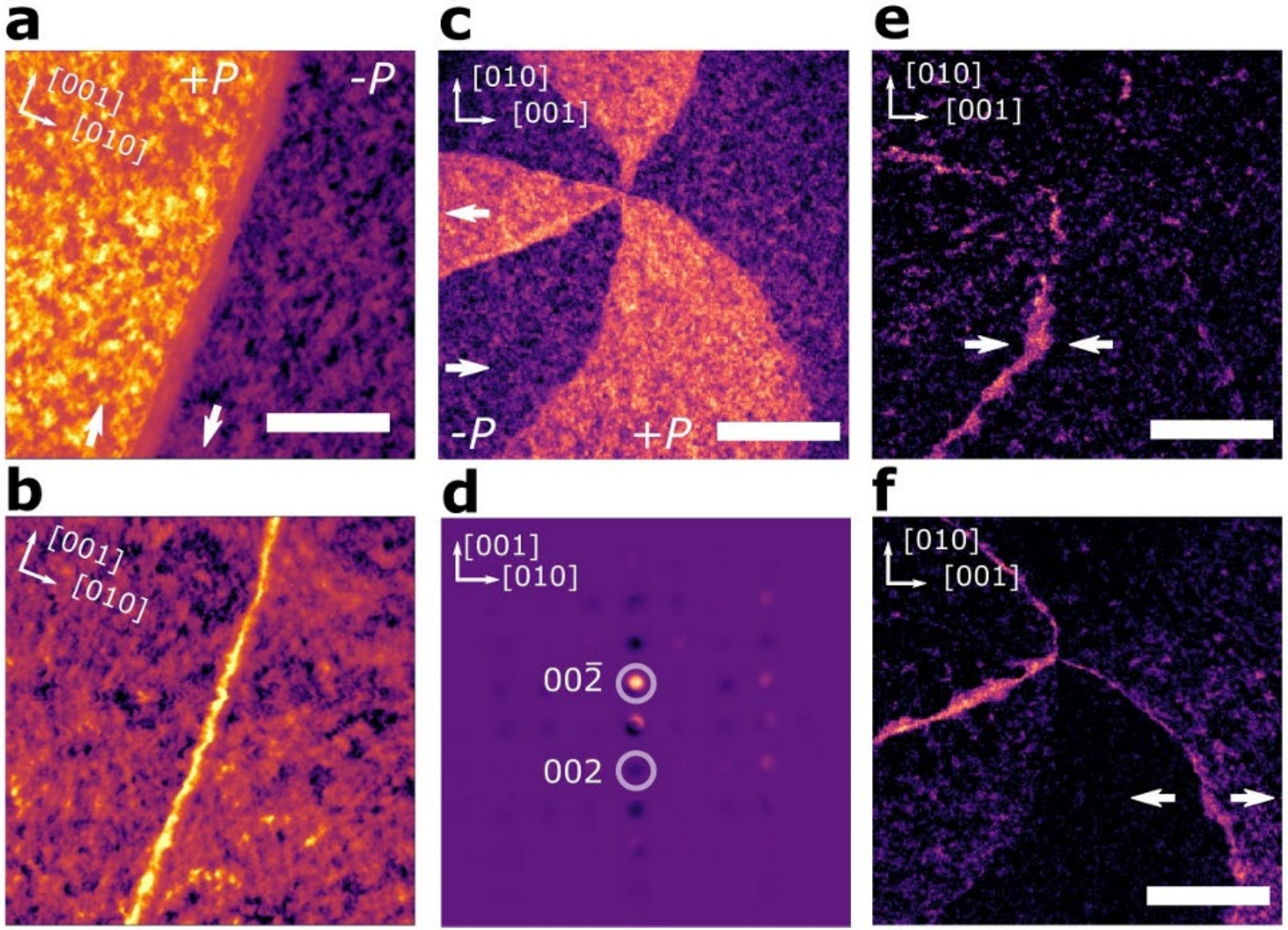
Ludacka, U., He, J., Qin, S., Zahn, M., Christiansen, E. F., Hunnestad, K. A., Yan, Z., Bourret, E., Kézsmárki, I., van Helvoort, A. T. J., Agar, J. & Meier, D. Imaging and structure analysis of ferroelectric domains, domain walls, and vortices by scanning electron diffraction. *arXiv [cond-mat.mtrl-sci]* (2023).

Domain Detection in 4D STEM



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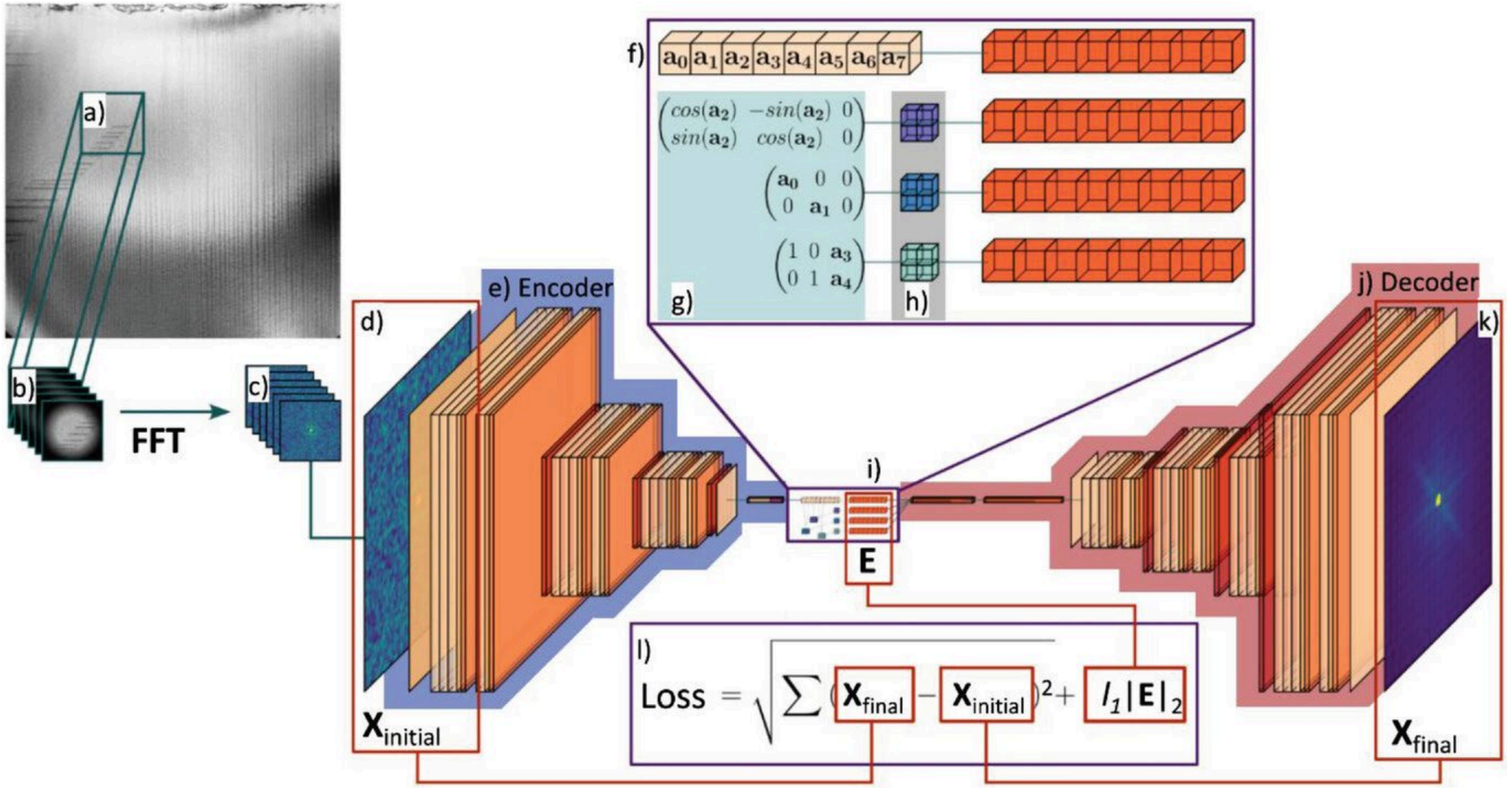
Bright-Field Domain Structure Disentanglement



O'Reilly, T., Holsgrove, K. M., Zhang, X., Scott, J. J. R., Gaponenko, I., Kumar, P., Agar, J., Paruch, P. & Arredondo, M. The effect of chemical environment and temperature on the domain structure of free-standing BaTiO3 via in situ STEM. *Adv. Sci.* e2303028 (2023). doi:10.1002/advs.202303028 doi:10.1002/advs.202303028

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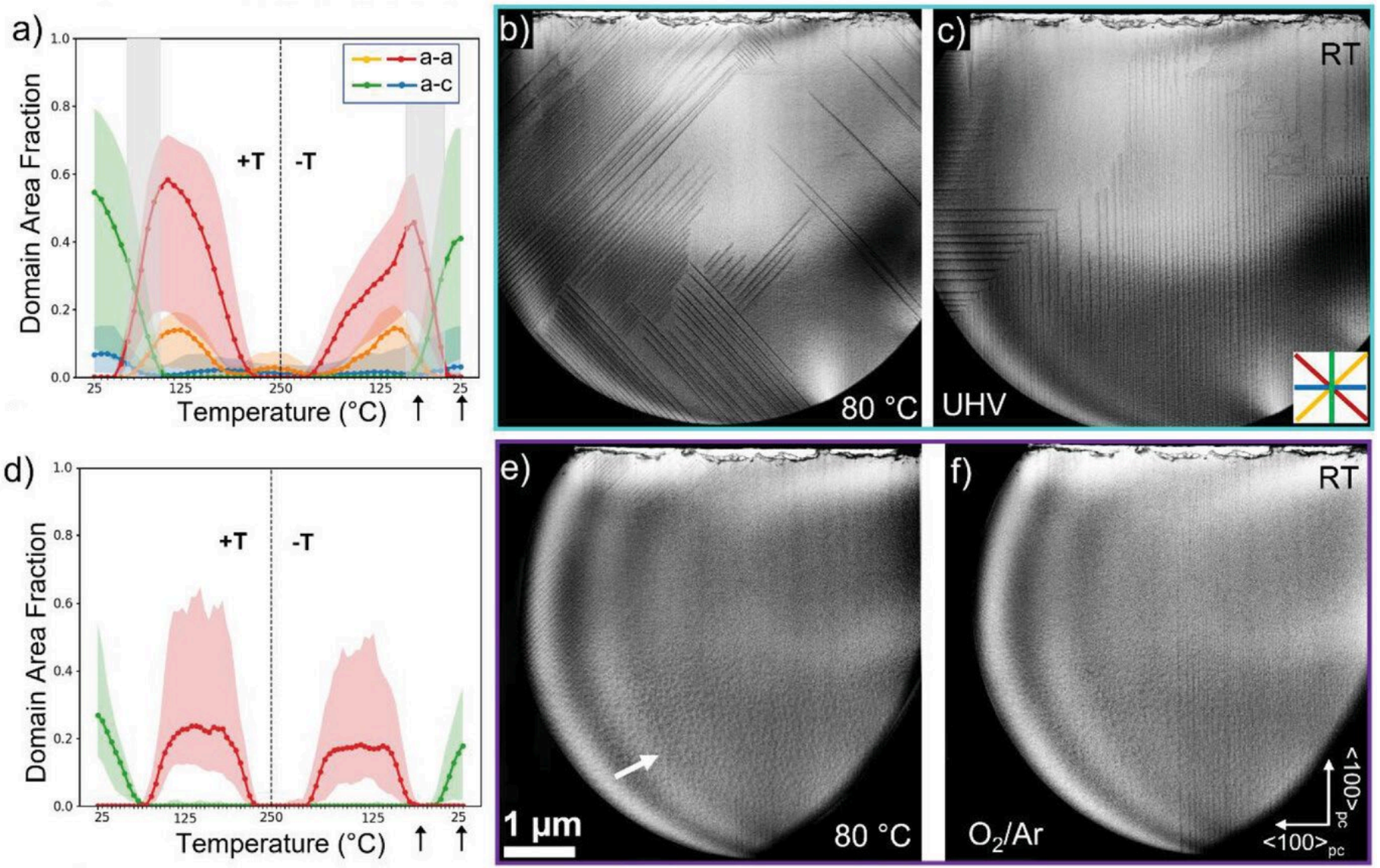

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