doi:10.1017/S1431927622003282
Microsc. Microanal. 28 (Suppl 1), 2022

A Reconstruction Wizard for Electrostatic Reconstruction

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Standard atom probe tomography (APT) reconstructions assume a spherical apex shape typically in conjunction with an analytical projection law to recreate spatial positions for detected ion events. [1, 2] To provide the flexibility required to improved reconstructions of APT data collected from aspherical specimen apex shapes we have been developing reconstruction tools based on a system of programmable arrays of point charges. [3,4] We report continued development of software tools to perform reconstructions based on electrostatic calculations rather than using analytic projection law approximations.

We have added more flexibility to the specimen models, including the ability to tilt specimen geometry with respect to the primary instrument axis, and to create bladed specimens. In addition, these geometric adjustments can be applied in the construction of equilibrated apex shapes where the apex geometry is relaxed to produce uniform electric field across the apex surface.

The introduction of the Invizo 6000™ and its associated full field of view in many situations enables some new techniques to be employed in the reconstruction of planar features with differing evaporation properties. We describe an Adaptive Landmark Reconstruction procedure to automatically generate a sequence of apex shapes that can be used in electrostatic reconstruction to flatten horizontal planar interfaces.

In addition to a relative density quality metric previously described [5], we also implement the DF-Fit metric which can be used to indicate presence of crystallinity [6]. Both metrics are available for both the classic reconstruction techniques based on a spherical apex shape as well as the new electrostatic reconstructions.

These features will soon be exposed in the AP Suite Reconstruction Wizard in upcoming versions of the software.

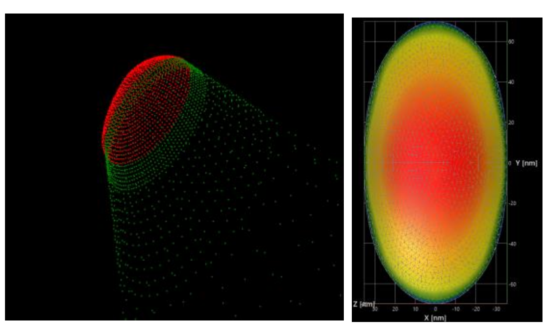

Figure 1. A specimen model used for reconstruction with a blade factor 2, an equilibrated bladed apex showing field variation of about 1 V/nm across the surface.

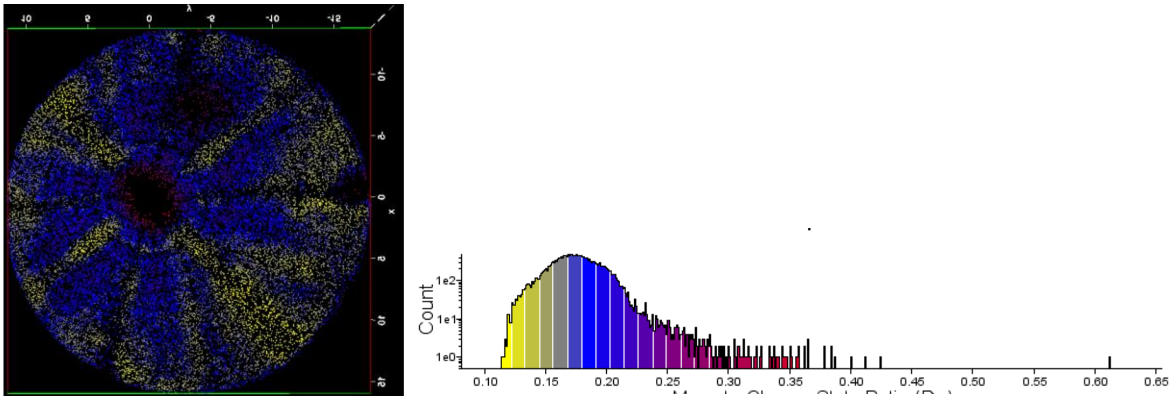

Figure 2. DF-Fit result from a reconstructed Tungsten sample, higher metric values correspond to higher levels of observed crystallinity.

References:

[1] P. Bas, et al., Appl. Surf. Sci. **87/88** (1995) 298.
[2] De Geuser, F. and B. Gault, Microscopy and Microanalysis **23** (2017), p. 238. doi: 10.1017/S1431927620022217
[3] B. Geiser et al., Microscopy and Microanalysis **26** (2020), p. 2622. doi: 10.1017/S1431927619002411
[4] B. Geiser et al., Microscopy and Microanalysis **27** (2021), p. 2482. doi: 10.1017/S1431927621008850
[5] B. Geiser et al., Microscopy and Microanalysis **25** (2019), p. 336. doi: 10.1017/S1431927619002411
[6] D. Haley et al., Microscopy and Microanalysis **25** (2019), p. 331. doi: 10.1017/S1431927618015507

https://doi.org/10.1017/S1431927622003282 Published online by Cambridge University Press