

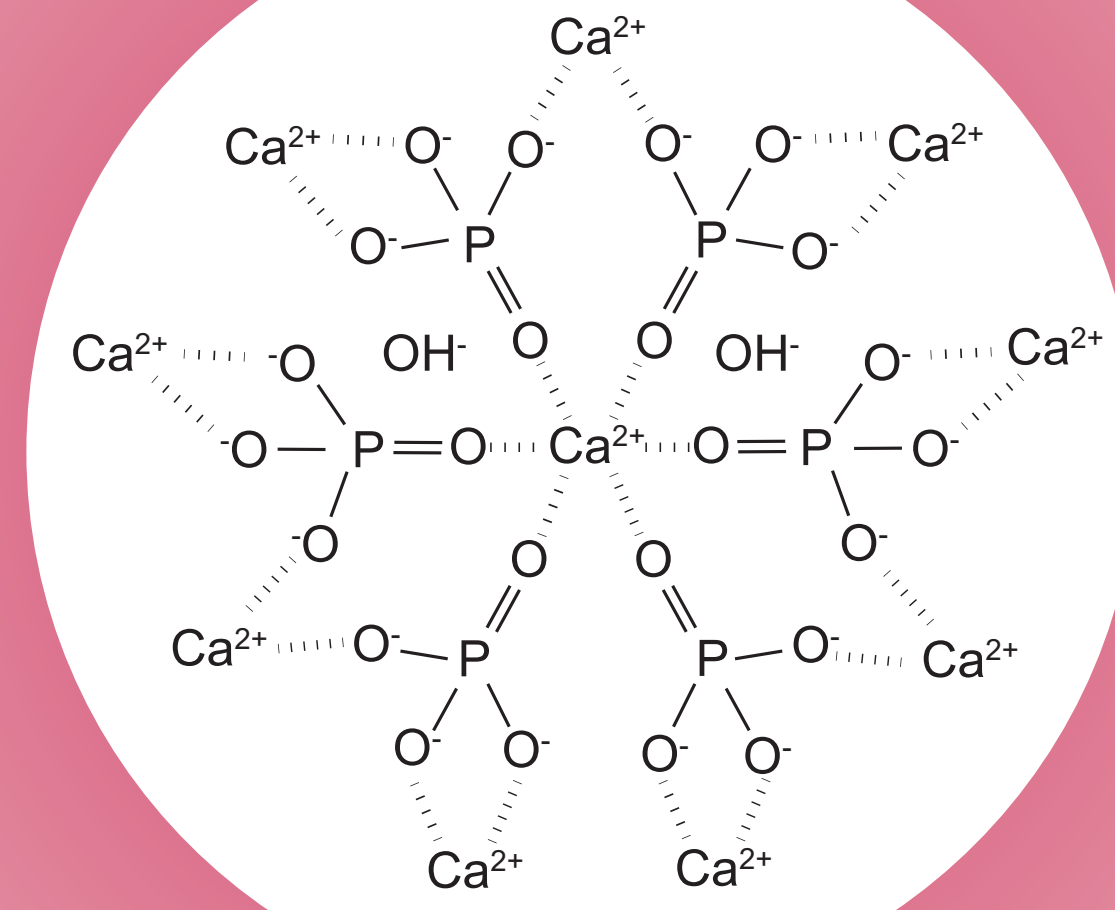
High Resolution Mapping of DCIS Breast Microcalcifications

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Ductal Carcinoma In Situ

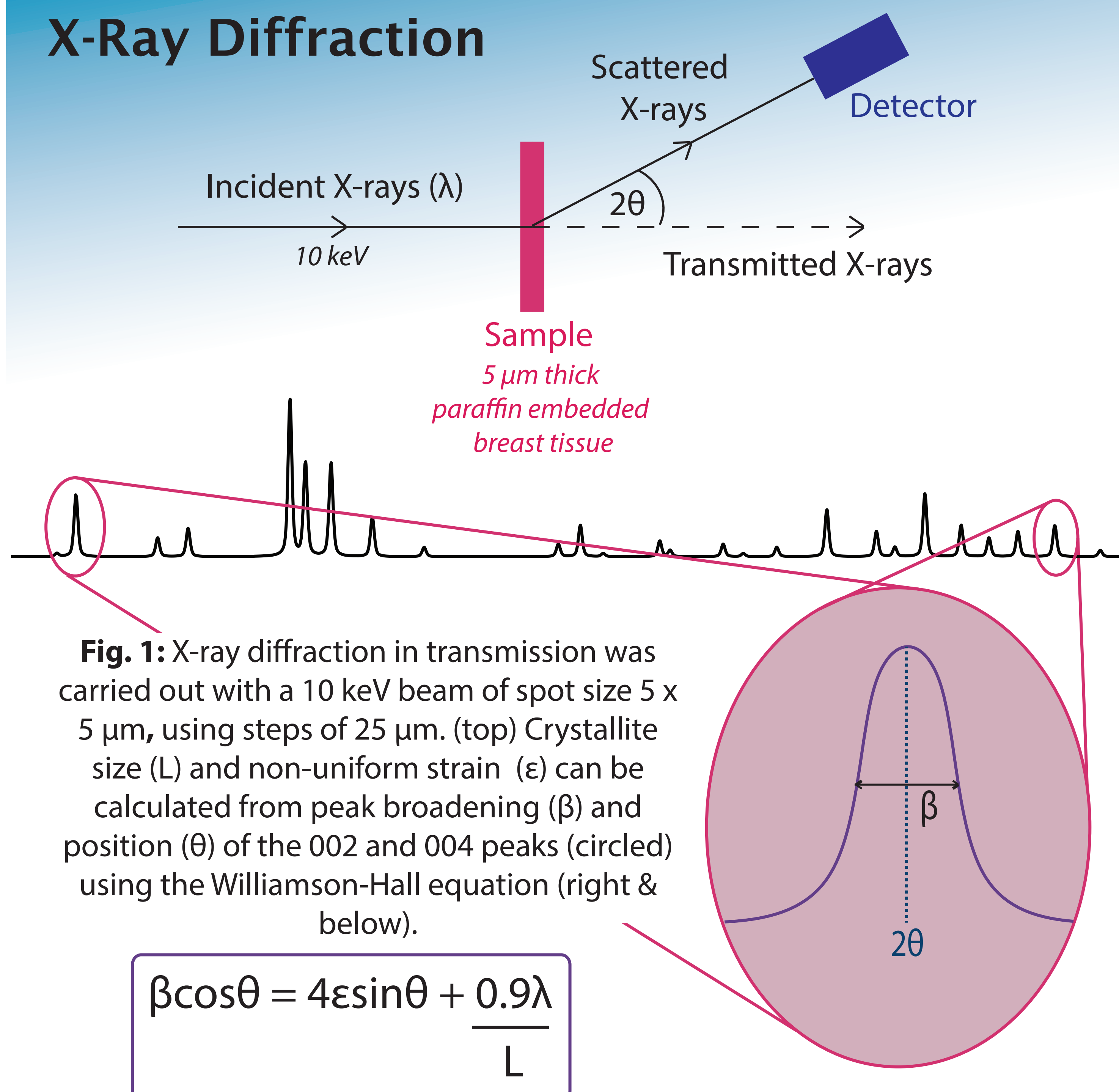
- > Ductal carcinoma in-situ (DCIS) is a pathological breast disease with the potential to form invasive breast cancer.
- > DCIS is usually diagnosed using breast screening mammography by the presence of calcium deposits (microcalcifications)¹.



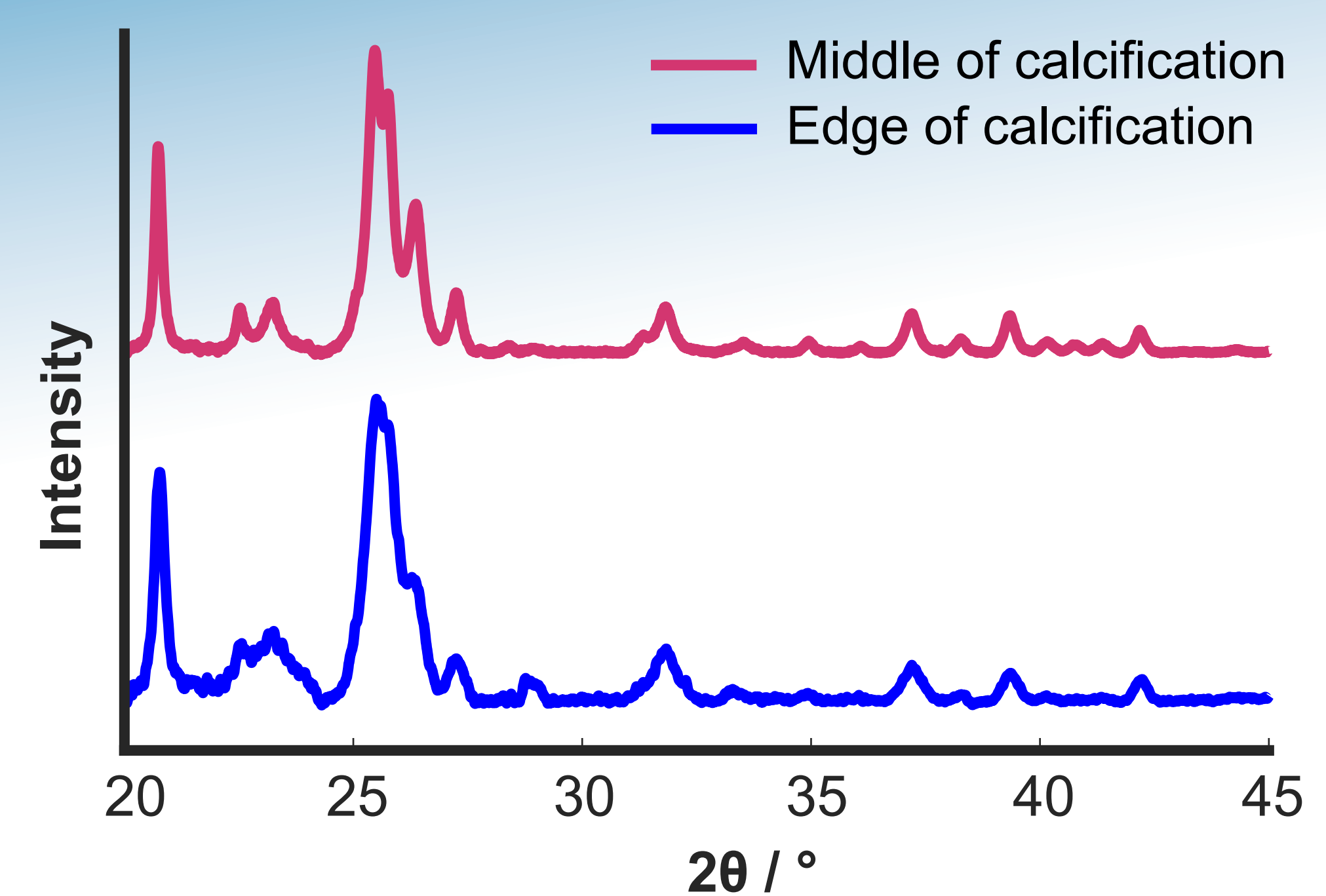
Microcalcifications

- > Microcalcifications in pathological breast tissue are made of calcium phosphate (hydroxyapatite)².
- > How and why calcifications form is unknown.
- > Hydroxyapatite is a nanocrystalline material, which can be examined using X-ray diffraction.

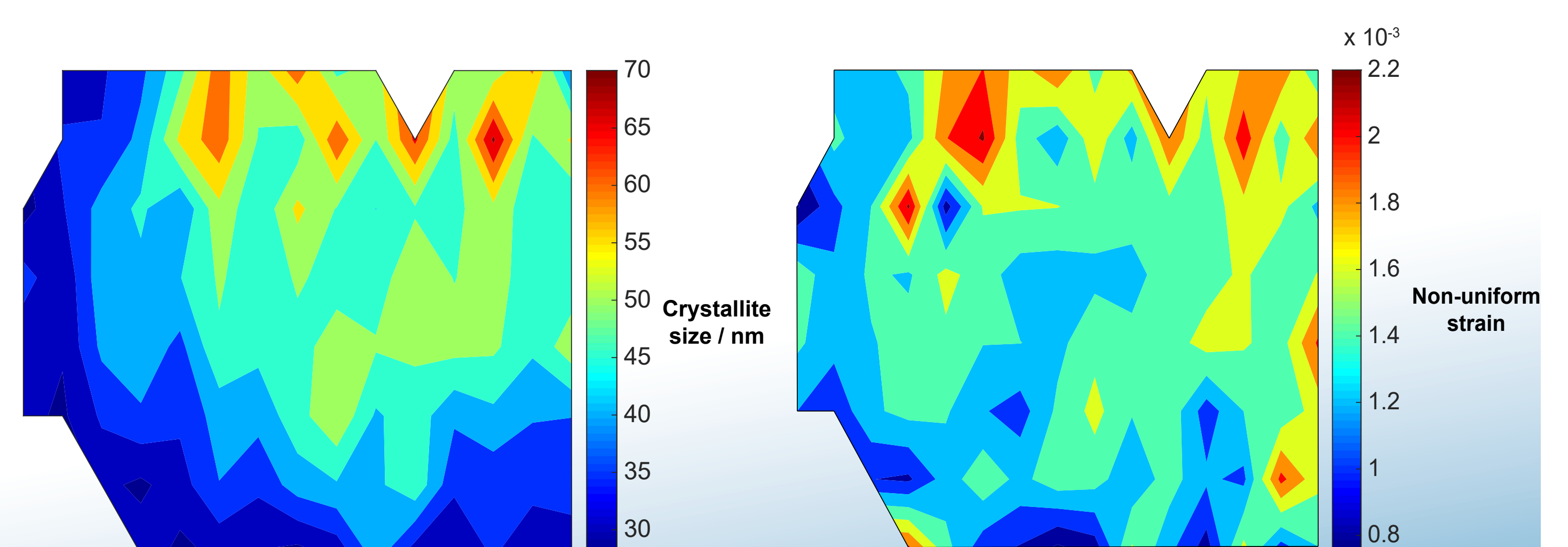
X-Ray Diffraction



Hydroxyapatite Heterogeneity

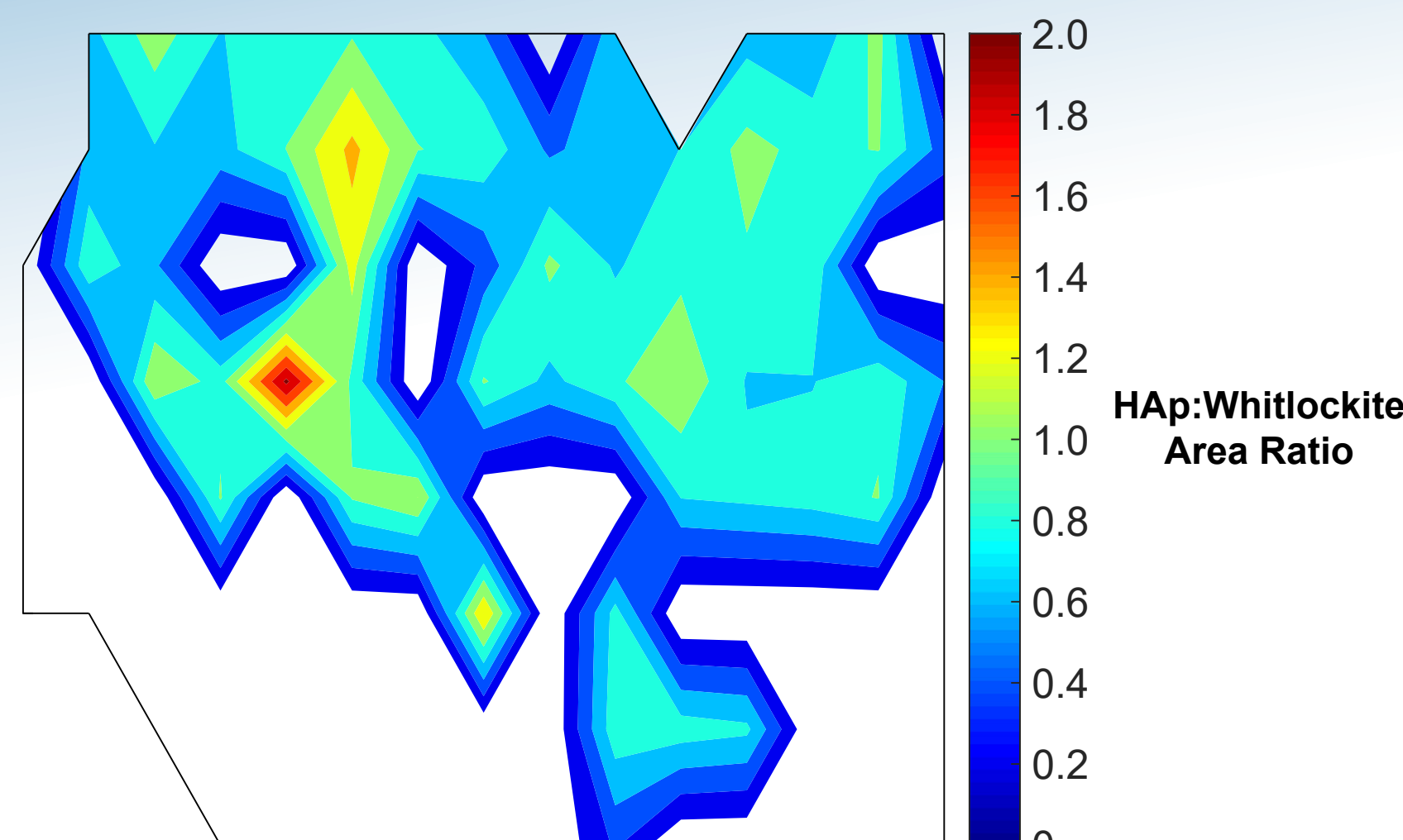


- > Hydroxyapatite crystallites are larger and more strained towards the centre of the calcification.
- > Central crystallites are more mature than peripheral ones, suggesting they were formed earlier.



An additional phase

- > Whitlockite is an additional phase found in microcalcifications³.
- > Whitlockite is present heterogeneously, and found at higher levels in central regions.



Conclusion

- > DCIS microcalcifications show high levels of nanostructure heterogeneity.
- > Calcifications are not exclusively composed of hydroxyapatite.
- > High resolution maps may provide an insight into how microcalcifications form in pathological breast tissue.

References

1. Groen EJ et al. Breast. Elsevier Ltd; 2017;31:274–83. doi:10.1016/j.breast.2016.09.001
2. Frappart L et al. Hum Pathol. 1984;15:880–9. doi:10.1016/S0046-8177(84)80150-1
3. Scott R et al. npj Breast Cancer. 2016;2:16029. doi:10.1038/npjbcancer.2016.29