

## **Nuclear Microscopy of biological cells using MeV ions: A critical review.**

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Nuclear microscopy has now reached the point where sub-100nm resolutions can be routinely achieved for low current application such as Scanning Transmission Ion Microscopy (1). Since simulations and experimental results have indicated that this resolution is maintained through a whole biological cell, then we now have the potential of imaging the interior of whole cells at unprecedented spatial resolutions (2,3).

This review will concentrate on the work carried out so far on both structural and elemental analysis of biological cells using a focused beam of MeV ions. The talk will include the strengths and weaknesses of nuclear microscopy in this field, and also include a description of competing techniques both for elemental analysis and structural imaging.

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- (2) Chen, X., Chen, C.-B., Udalgama, C.N.B., Ren, M., Fong, K.E., Yung, L.Y.L., Giorgia, P., Bettiol, A.A., Watt, F. High-resolution 3D imaging and quantification of gold nanoparticles in a whole cell using scanning transmission ion microscopy, (2013) Biophysical Journal, 104 (7), pp. 1419-1425.
- (3) Udalgama, C., Bettiol, A.A., Watt, F. Stochastic spatial energy deposition profiles for MeV protons and keV electrons, (2009) Physical Review B - Condensed Matter and Materials Physics, 80 (22).

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