

## ***Recovery of IR Absorbance Spectra of Spherically Shaped Biological Systems***

Rozalia Lukacs<sup>1,\*</sup>, Reinhold Blümel<sup>2</sup>, Achim Kohler<sup>1</sup>

<sup>1</sup> Department of Mathematical Sciences and Technology, Faculty of Environmental Science and Technology, Norwegian University of Life Sciences, 1432 Ås, Norway.

<sup>2</sup> Department of Physics, Wesleyan University, 265 Church Street, Middletown, Connecticut 06459-0155, USA.

\*e-mail: rozalia.lukacs@nmbu.no

In this paper, the exact theory of scattering of infrared light at absorbing spheres is presented. The theory is based on the exact Mie solutions and takes into account the high numerical aperture of infrared microscopes. The new theory is applied in an iterative algorithm developed by Lukacs et al. <sup>1</sup> to recover the pure absorbance spectrum of biological systems with spherical symmetry. This method is a further development of the recently described iterative algorithm of van Dijk et al <sup>2</sup>. The method is tested on FTIR synchrotron spectra of pollen grains with approximately spherical shape and on spectra of cell nuclei. The imaginary part of the refractive index was successfully recovered for both systems.

### References

- [1] R. Lukacs, R. Blumel, B. Zimmerman, M. Bagcioglu, and A. Kohler, *Analyst* 140, 3273-3284 (2015).
- [2] T. van Dijk, D. Mayerich, P.S. Carney, and R. Bhargava, *Applied Spectroscopy* 67, 546-552 (2013).