From organo-selenium to selenium nanoparticles: mapping Se metabolic pathway in yeast using mass and X-ray spectroscopy

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*Saccharomyces cerevisiae* and many other microorganisms have the remarkable ability to accumulate large quantities of metallic/metalloid elements. This ability has been exploited for the production of yeast based mineral supplements which have been used for decades. However, the efficacy/toxicity of trace element is depends on its chemical form (i.e. speciation).

Using high resolution mass spectrometry the selenium analogs of the key metabolites of the sulfur amino acid pathway has been identified in selenium enriched yeast. Employing the developed analytical method the stress response of *Saccharomyces cerevisiae* to Se-Met, Se (IV) and Se (VI) was studied metabolites identified.

Here we report the presence of nanometer sized metallic deposits in yeast cells grown in the presence of either, Se, Au, or Pt identified using a combination of synchrotron based micro X-ray fluorescence and hard x-ray microscopy and nano secondary ion-, electrospray- and inductively coupled plasma-mass spectrometry.

![Figure 1: X-ray tomography of a selenized yeast cell cluster](image-url)