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# **Influence of X-ray $\mu$ -Computed Tomography on the microbial activity of a mixed thermophilic and mesophilic bioleaching culture colonising a mineral surface**

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## **Research Highlights:**

- Evaluation of the compatibility of X-ray  $\mu$ CT imaging and bioleaching microorganisms
- Suspended thermophiles unaffected at energy doses of 35-90 kV and 200-280  $\mu$ A
- Detrimental effect on suspended thermophiles exposed at 120 and 150 kV
- Mesophile activity on pyrite mineral surface unaffected by lower energy X-ray  $\mu$ CT

## **Abstract**

X-ray micro-Computed Tomography (X-ray  $\mu$ CT) allows for non-invasive 3D investigations of heap leaching processes. It permits study of mineral liberation, pore network structure in particles or beds, and bioleaching of non-surface mineral grains. A premise for bioleaching studies integrating X-ray  $\mu$ CT is that the metabolic activity of microorganisms is not affected by X-ray energy doses. This study therefore evaluates the compatibility bioleaching microorganisms with X-ray energy exposure. The X-ray effect on a mixed thermophilic culture suspended in solution was assessed using imaging conditions of 35-150 kV, 200-280  $\mu$ A and 1-2 hours. Microorganisms were unaffected between 35-90 kV and 200-280  $\mu$ A while there was some detrimental effect at 120 and 150 kV. The X-ray influence on a mixed mesophilic culture colonising a mineral surface was investigated at 90 kV and 225  $\mu$ A for a 1 hour exposure time. The system was monitored before and after exposure through

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