

## **Characterization of forms of zero-valent sulfur in the microbial metabolism of sulfur and thiosulfate and in enzymatic sulfur reduction**

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In microbiology, elemental sulfur has generally been assumed to take the form of either insoluble S<sub>8</sub> or soluble polysulfide (S<sub>n</sub><sup>2-</sup>)/sulfide (S<sup>2-</sup>). In reality, however, sulfur can form a range of different allotropes and can come in the form of particles with very different sizes and characteristics, the speciation of which can control availability to microbes, enzymes, and abiotic reactants. In the studies described here cyclic voltammetry with solid-state mercury/gold amalgam electrodes has been used to characterize 1) the forms and relative amounts of zero-valent sulfur metabolized and produced by cultures of thiosulfate and elemental sulfur-reducing hyperthermophiles, 2) sulfur particles utilized by sulfur-reducing enzymes from hyperthermophiles typically present in hot subsurface petroleum reservoirs, and 3) sulfur species present in hot, hydrocarbon-rich fluids from a subsurface reservoir.