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***Urease inhibition, transport, and distribution to better understand its subsurface behavior***

Biom mineralization is a capable technology being developed and researched today. Biom mineralization is the formation of a precipitate, namely calcium carbonate, from a saturated solution that can be used to remediate toxic metals, plug small pores, seal fissures, and many more. Biom mineralization has been used to seal wellbores, and shows promise in its ability to store supercritical CO<sub>2</sub> and stop the leaking of methane from wells. The bacterium *Sporosarcina pasteurii* has been studied in depth as a source of biom mineralization as it produces large amounts of the enzyme urease. This enzyme breaks down urea into ammonium and carbonate, and if calcium is present at sufficiently high concentrations calcium carbonate starts to precipitate inducing biom mineralization. A eukaryotic source of enzyme, Jack bean, has also been studied, and shows potential in conjunction with the bacterial method. Inhibition studies were performed using Jack bean urease and chloride salts of copper, zinc, and cobalt to identify whether the enzyme might become inhibited for instance by replacement of the essential enzyme cofactor, nickel. It was found that copper and cobalt inhibited the enzyme more than zinc at low concentrations. The inhibition was found to be not significant enough to stop enzymatic activity in true subsurface applications where the concentrations of these metals are routinely very low. Additional research indicates that microbially induced calcium carbonate precipitation appears to create a much stronger seal than enzyme induced precipitation. Based on these findings, we are currently conducting column studies at 60°C using inactivated *S. pasteurii* as a source of urease. We will spatially map the distribution of calcium carbonate precipitates to optimize seal placement.

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