

MONITORING OF FeS₂ REACTIONS USING HIGH TEMPERATURE XRD COUPLED WITH GAS CHROMATOGRAPHY (GC)

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Thermal batteries are an important technology for applications requiring long shelf-life and high electrical power output. Sulfide compounds such as FeS₂ can be employed within these fabricated cells to generate the cathode portion of the cell. Behavior of the cathode material in the presence of an electrolyte (often K/Li salts) as well as differing atmospheric conditions (e.g air vs. inert) can play a role in the possible decomposition of the sulfide cathode. We have configured our high temperature XRD system with a portable Gas Chromatography (GC) instrument to enable in-situ characterization of iron sulfide phases during heat treatment schedules along with simultaneous detection of off-gassing species during such reactions. We shall report the impact of electrolyte content as well as pO₂ on the changes in iron sulfide phases and possible side reactions during heat treatment. Results will be presented in the context of phase stability of the FeS₂ compound and the impact of decomposition on the ultimate functionality of a fabricated thermal cell.

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Poster presentation (XRD session)
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