# Metal centre-assisted signalling by hydrogen sulfide

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In order to maintain life, nature actually uses a limited number of chemical reactions, one of which is sulfur-based chemistry, mainly exploited for the control of intracellular redox homeostasis and redox-based signalling. Hydrogen sulfide ($H_2S$) is one of the simplest sulfur-containing molecules found in the cells and ever since the first report of its potential physiological role, there has been a burgeoning literature on the subject of $H_2S$ signalling. One of the main mechanisms by which sulfide signals in the cells is via posttranslational modification of cysteine residues called persulfidation. However, the underlying mechanisms of $H_2S$-mediated persulfidation are not completely clear. $H_2S$ cannot simply react with cysteine residue and the presence of an oxidant is required. Metal centres on metalloproteins could help catalysing this process. In this talk we will first focus on how iron-heme metal centres control sulfide signalling and protein persulfidation. Unravelling of the mechanistic aspects of these processes will be particularly emphasized. We will also discuss how these findings inspired design of porphyrin-based catalysts for efficient industrial removal of $H_2S$. Finally, we will focus also on persulfidation catalysed by non-redox active metal centres, such as zinc, and mechanism(s) by which zinc finger proteins and other zinc containing proteins could oxidize sulfide.