Perspectives on Atmospheric CO2 Fixation in Inorganic and Biomimetic Structures

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Abstract:

In this review, we examine the fixation of atmospheric carbon dioxide, primarily in inorganic and biomimetic structures, the latter of which can be seen to be inspired by Nature. We discuss coordination modes in polynuclear metal\textsuperscript{\textregistered}CO2 complexes, CO2 fixation by metallic complexes (poly-nuclear), and fixation by assembly formation. While a number of enzymes exist for the purpose of fixing CO\textsubscript{2}, we consider the broad processes exhibited by the enzymes carbonic anhydrase, urease and, more specifically, Rubisco, as well as the inspiration it provides in attempting to develop synthetic derivatives. Recently, ab initio and classical molecular simulation methods have been applied to the modelling of CO\textsubscript{2} fixation in Rubisco, and especially in inorganic and biomimetic compounds, which together yield useful insights which could prove useful in the development of next generation CO\textsubscript{2} fixation catalysts.

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