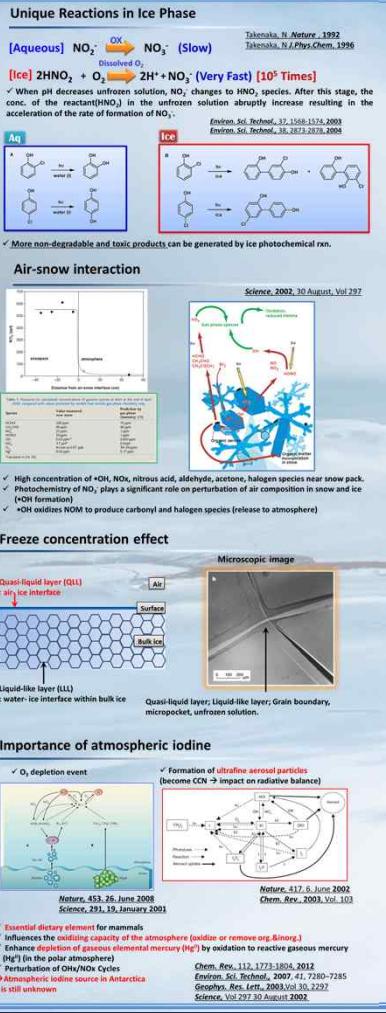


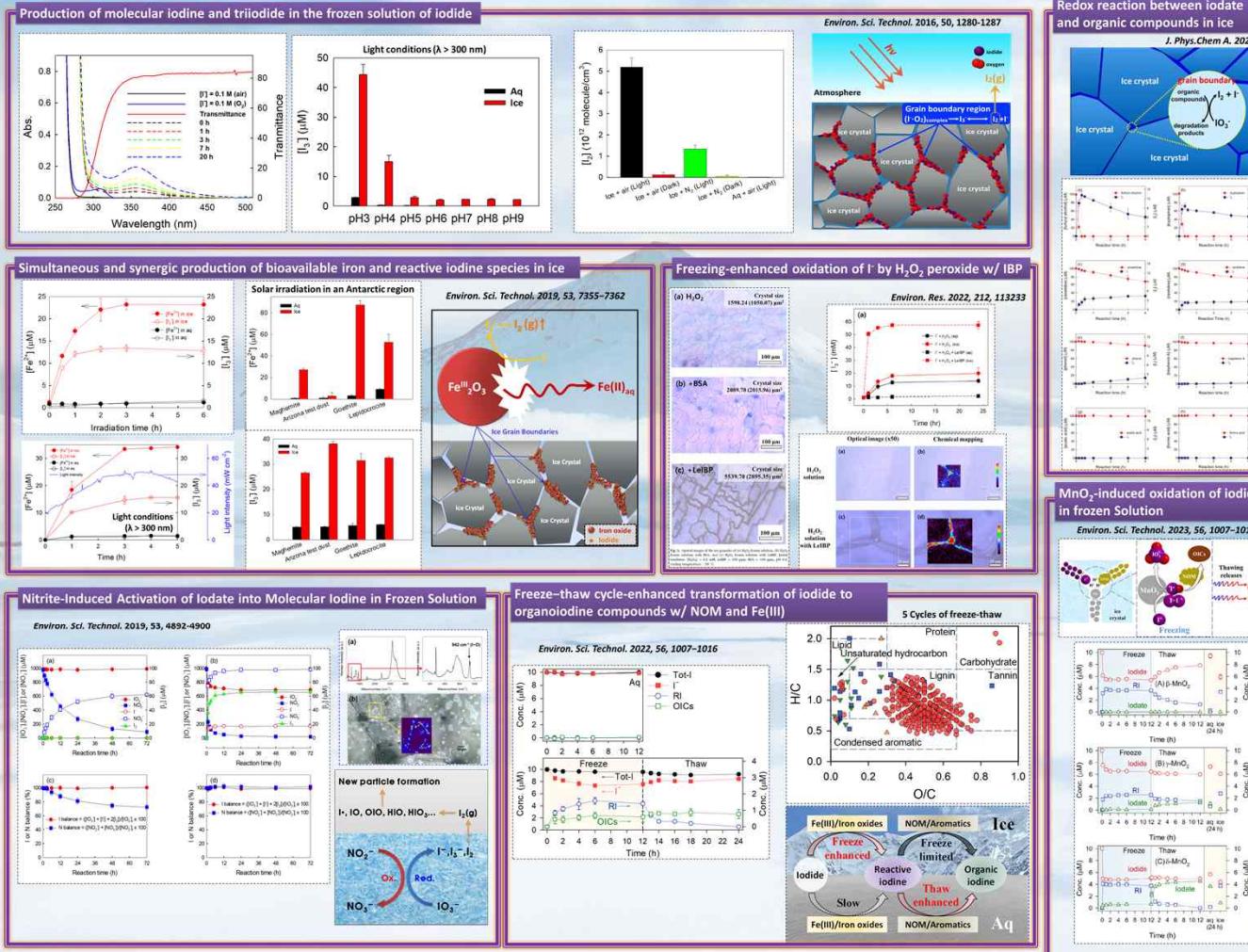
# Abiotic transformation of iodine species in ice and its environmental implications

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## Introduction



## Result & Discussion



## Conclusions

- The production of tri-iodide( $\text{I}_3^-$ ) via iodide( $\text{I}^-$ ) oxidation, which is negligible in aqueous solution, is significantly accelerated in frozen solution, both in the presence and the absence of solar irradiation.
- The chemical reaction between iron oxides and iodide( $\text{I}^-$ ) is markedly accelerated to produce bioavailable iron ( $\text{Fe(II)}_{\text{aq}}$ ) and tri-iodide ( $\text{I}_3^-$ ): evaporable in the form of  $\text{I}_2$  in frozen solution (both with and without light irradiation) while it is negligible in aqueous phase.
- The mechanism for  $\text{I}^-$  activation into  $\text{I}_3^-$  by  $\text{H}_2\text{O}_2$  in a frozen solution was developed, and it was found that Arctic extracellular ice-binding glycoprotein (LeIPB) enhanced the  $\text{I}^-$  activation.
- The chemical reaction between iron oxides and iodide( $\text{I}^-$ ) in the presence of natural organic matter enhances the formation of organoiodine compounds (OICs) in frozen solution, and freeze-thaw cycling solutions.
- The production of reactive iodine and organoiodine compounds from iodide oxidation can be significantly accelerated in frozen solution containing manganese dioxide and natural organic matter.
- We propose that an accelerated abiotic transformation of  $\text{I}^-$  in ice media provides a previously unrecognized formation pathway of reactive iodine species and OICs in the polar atmosphere or freeze-thaw cycled circumstances.

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