

**Docket #:** S21-245

# **Infrared Spectroscopy of Carbon Dioxide Hydration**

Measurement of dissolved CO<sub>2</sub> has critical applications in healthcare monitoring and consumer goods quality control, yet is difficult to measure directly. Common methods include titration, measuring off-gas pressure, electrical conductivity or calculating chemical equilibria, all of which require a secondary calculating to determine the concentration of dissolved CO<sub>2</sub>. Here researchers in the Dai lab have developed an infrared (IR) spectroscopy technique that allows them to overcome the typical challenge of CO<sub>2</sub> peaks being overshadowed by water. This ~100 micron IR cell creates a thin film of solution where the water does not absorb all the light, allowing the CO<sub>2</sub> signal to be resolved and quantified. This configuration tolerates high pressure systems (up to 58 atm) and still allows for clear CO<sub>2</sub> quantification. From CO<sub>2</sub> capture to consumer drinks and healthcare monitoring via dissolved CO<sub>2</sub> in blood, this technique provides a reliable, accurate and direct method for in situ measurement of dissolved CO<sub>2</sub>.

## **Stage of Research**

- Prototype

## **Applications**

- Quantitative analysis of dissolved CO<sub>2</sub>
- Consumer drinks: quality control and changing taste profiles of carbonated drinks
- Healthcare: measuring CO<sub>2</sub> levels in blood

## **Advantages**

- Direct, in situ measurement of dissolved CO<sub>2</sub> vs measuring the gaseous phase and solving equilibria equations
- Capable of measuring high pressure or time-dependent systems

## Publications

- Li, Jiachen, Jinyu Guo, and Hongjie Dai. "[Probing dissolved CO<sub>2</sub> \(aq\) in aqueous solutions for CO<sub>2</sub> electroreduction and storage.](#)" *Science advances* 8.19 (2022): eabo0399.

## Patents

- Published Application: [WO2023069453](#)

## Innovators

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