



# Online Molten Salt and Gas Monitoring Using Combined Spectroscopic Methods

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*Changing the World's Energy Future*

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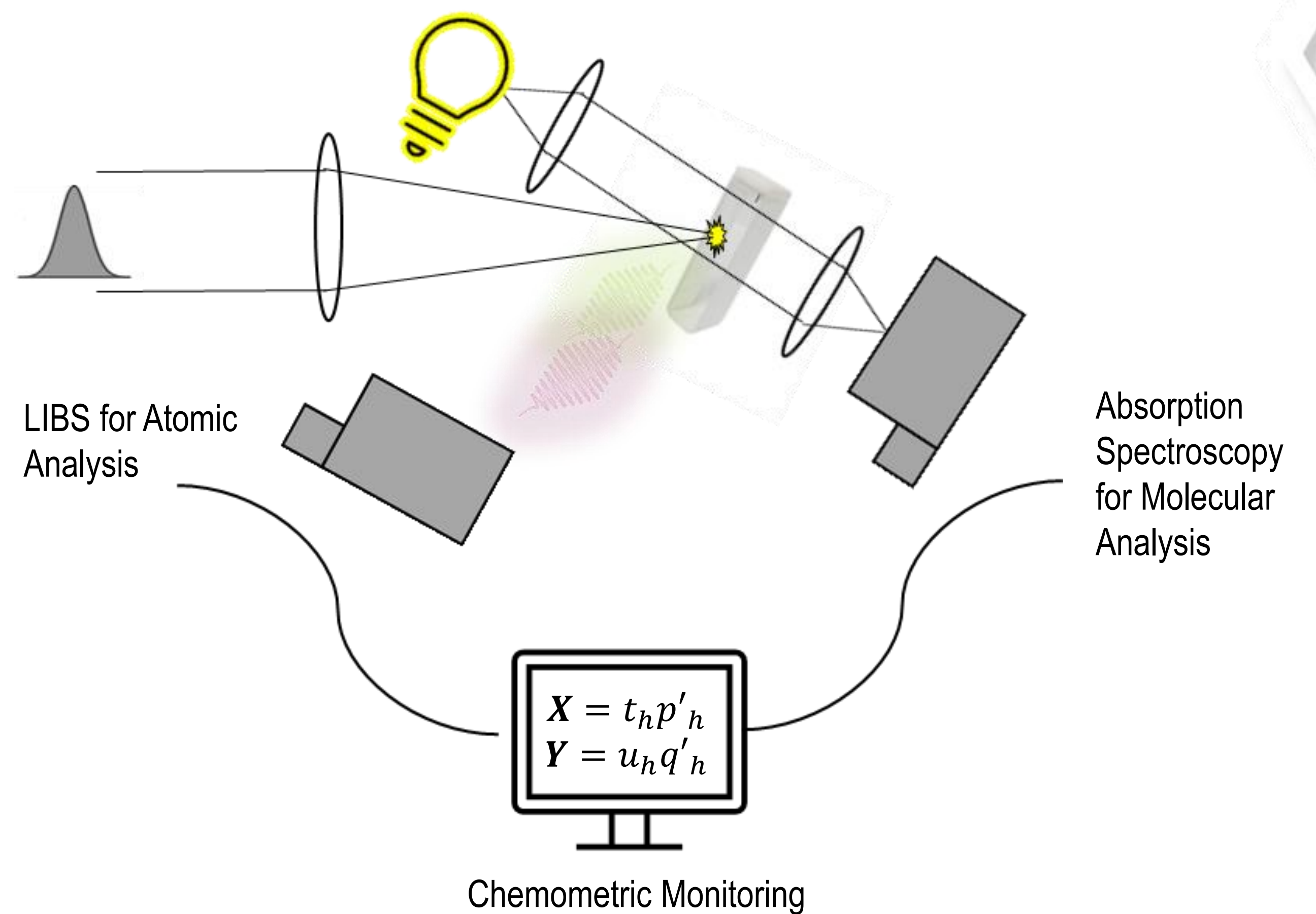


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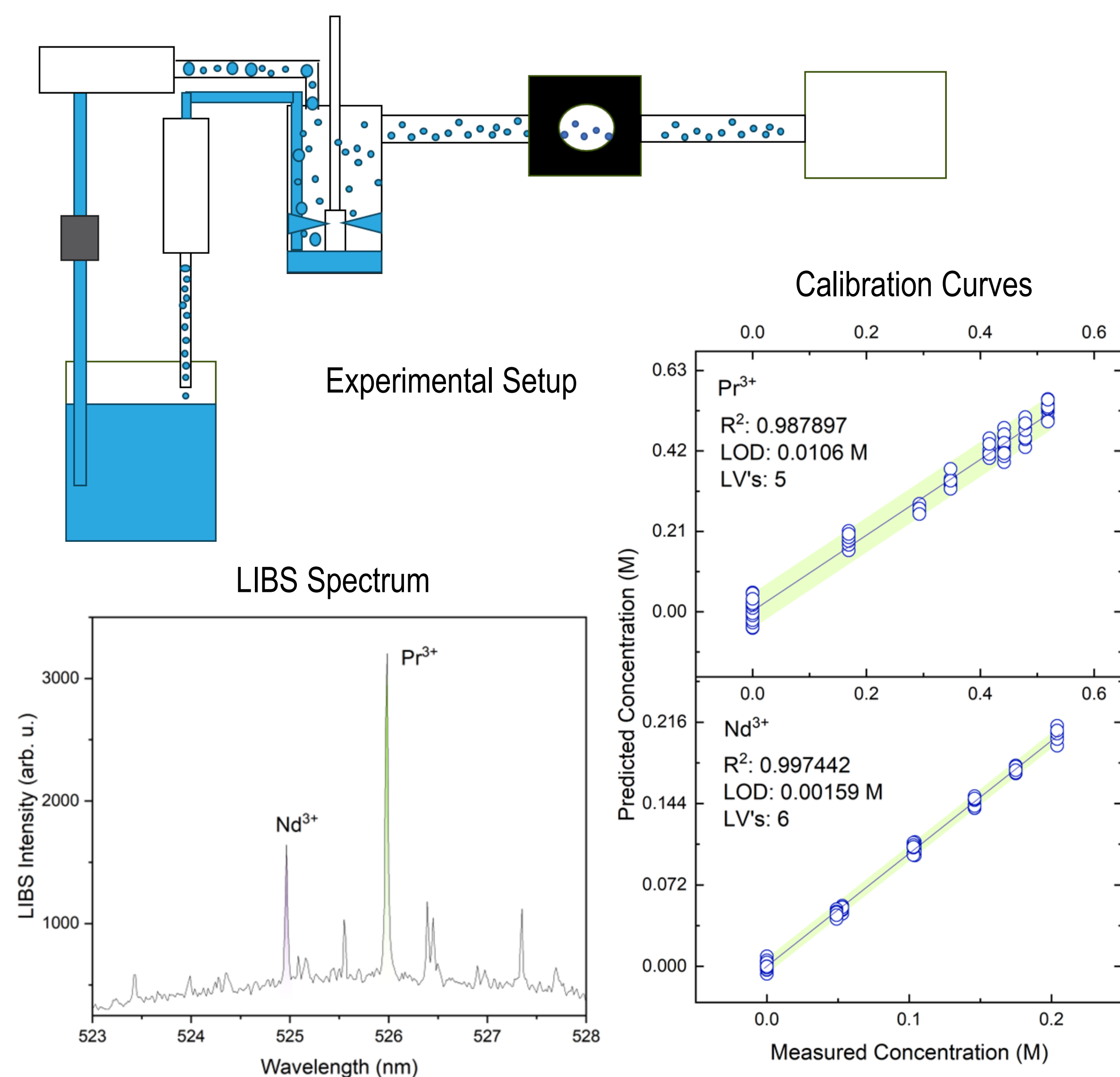
Ammon Williams, Ruchi Gakhar

The nonproliferation of nuclear material and the development of safeguards technologies to sample and analyze fuel salt is a challenge for molten salt reactor (MSR) developers. We seek online monitoring using combined spectroscopic methods of two distinct material phases from MSR's

- Molten salt transformed to aerosol phase which allows for Light Induced Breakdown spectroscopy (LIBS) without adverse splashing (ARPA-E)
- Vaporized used nuclear fuel through chlorine-based volatility (CBV) for uranium separation based on boiling point differences

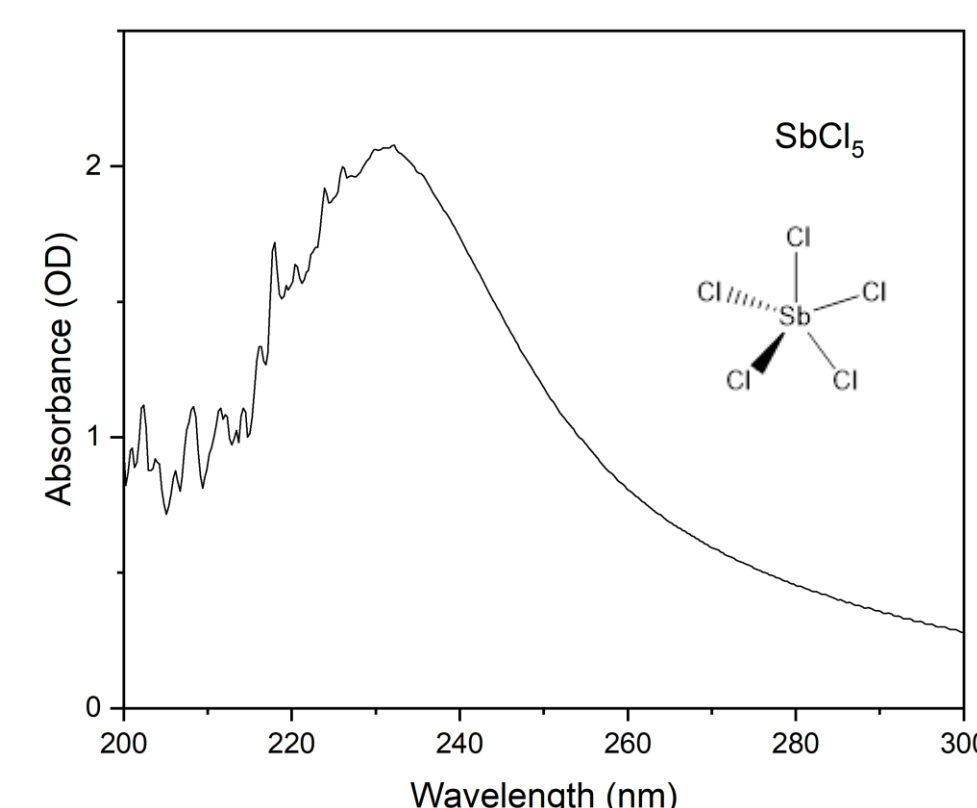


## Aerosol Project

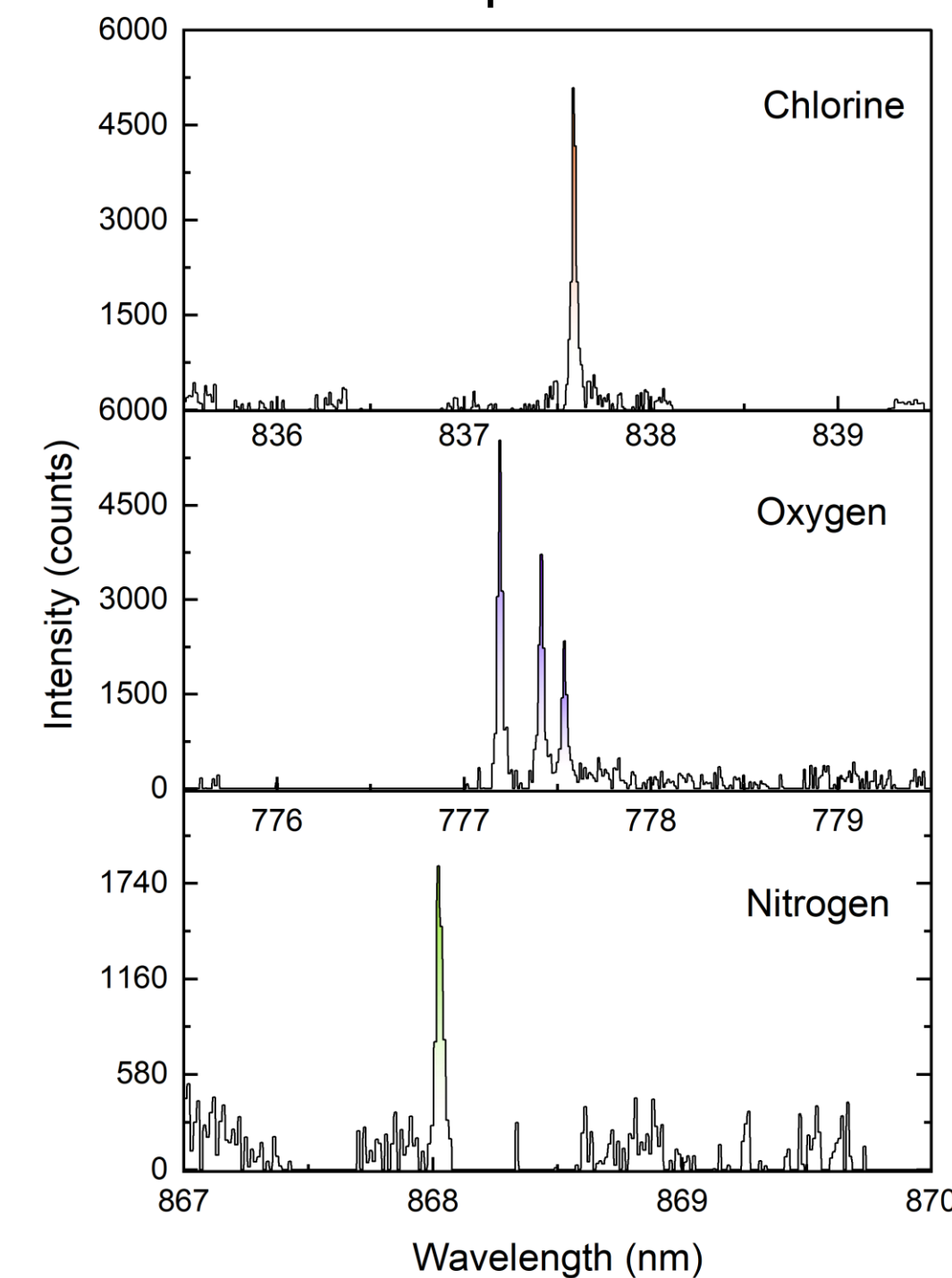


Future Work: acquire LIBS, UV-Vis absorption, and Raman measurements of molten salt aerosol

## Absorption Spectrum



## LIBS Spectra



Future Work: acquire LIBS, UV-Vis absorption, and Raman measurements of  $\text{UCl}_4$

## Vapor Phase Project



New Optical Cell