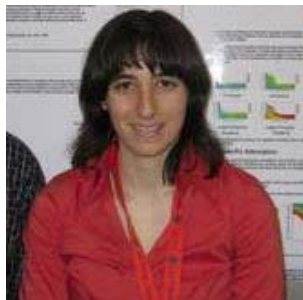


# PHYSICAL CHEMISTRY SEMINAR



**Prof. Brenda Rubenstein**  
Department of Chemistry  
*Brown University*

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Monday, Nov. 9, 2020  
4:00 PM  
via Zoom

## “Computing with Molecules: Storage and Classical Computation Using Small Molecules and Their Reaction Networks



As transistors near the size of molecules, computer engineers are increasingly finding themselves asking a once idle question: **how can we compute using chemistry?** In this talk, I will discuss recent progress my Brown Molecular Informatics team and I have made demonstrating how mixtures of small, unordered molecules can process information. During the first portion of this talk, I will illustrate how combinatorial chemical synthesis combined with high resolution mass spectrometry can be harnessed to store GBs of information in small molecules and metabolites. I will then turn to describing how basic principles of chemistry can be exploited to realize fully molecular neural networks for machine learning and image processing. I will end with a discussion of the challenges molecular computation faces that may be resolved with clever doses of synthetic and theoretical chemistry, and the connections molecular computation has to the field of systems chemistry.