I. Motivation
Generate micelles in the gas phase, and use them as nano-sized carriers/reactors to study chemistry of biomolecules solvated in gas-phase membrane-mimetic environments.

II. Apparatus & Methods
ESI Guided-Ion-Beam Tandem Mass Spectrometer

ESI of NaAOT solution, followed by
1) transfer of existing micelles to the gas phase, and
2) self-assembling of surfactants into micellar assemblies in the gas phase

II. Results

1. Formation of Multiply Positively-Charged NaAOT Reverse Micelles in The Gas Phase

2. Reverse-Micellar Structure & Encapsulation of Glycine

Size dependence of gas-phase RM encapsulation

3. Driving Forces for Incorporating Hydrophilic vs. Hydrophobic Amino Acids

4. How Does Charge State Affect Micellar Structures & Encapsulation?

How Does Charge State Affect Micellar Structures & Encapsulation?

\[ \text{CID of mass-selected charged micelles} \]
\[ \text{Asymmetric Fission} \]
\[ \text{Slices of two fragment ions produced from a charged aggregate differ greatly} \]
\[ \text{vs. Symmetric Fission of charged reverse micelles} \]

5. Step towards Generate Aqueous Solution in The Gas Phase

IV. Conclusions

\[ \text{NaAOT surfactants are able to self-assemble into highly-ordered micellar structures in the gas phase.} \]
\[ \text{Charge state affects micellar structure in the gas phase.} \]
\[ \text{Positively charged aggregates form a reverse micelle-like structure, while negatively charged aggregates adopt a direct micelle-like structure.} \]
\[ \text{Amino acids can be selectively encapsulated and transported by NaAOT reverse and direct micelles.} \]

Future Directions

\[ \text{Assembling of “Aqueous Solution” in gas-phase NaAOT micelles} \]

\[ \text{Reactions of single biomolecules encapsulation in gas-phase bio-membrane mimetic systems} \]


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