

Supporting Information:

Probing difference in diffusivity of chloromethanes through water ice in the temperature range of 110-150 K

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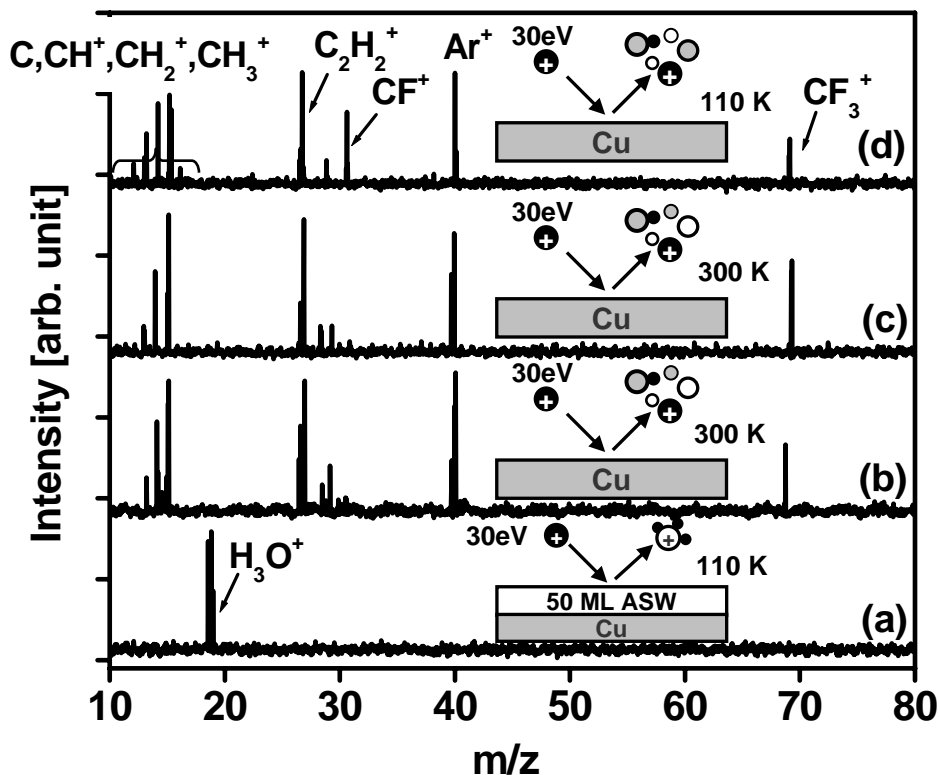


Figure S1. 30 eV Ar^+ ion sputtering of different surfaces showing the sensitivity of the instrument: (a) shows sputtering of ASW surface into H_3O^+ ions and (b) data from the copper surface at 300 K when mass filter is in the RF only mode ie; all ions produced by the EI source are colliding on the surface. The data from the same surface at 300 K and 110 K when Ar^+ (40 m/z) is mass selected are given in (c) and (d), respectively. The copper surfaces at room and low temperatures produce sputtering features due to the hydrocarbon film adsorbed on the surface. After the bake-out

process described in the experimental section, the intensities of these hydrocarbon peaks went below the noise level.

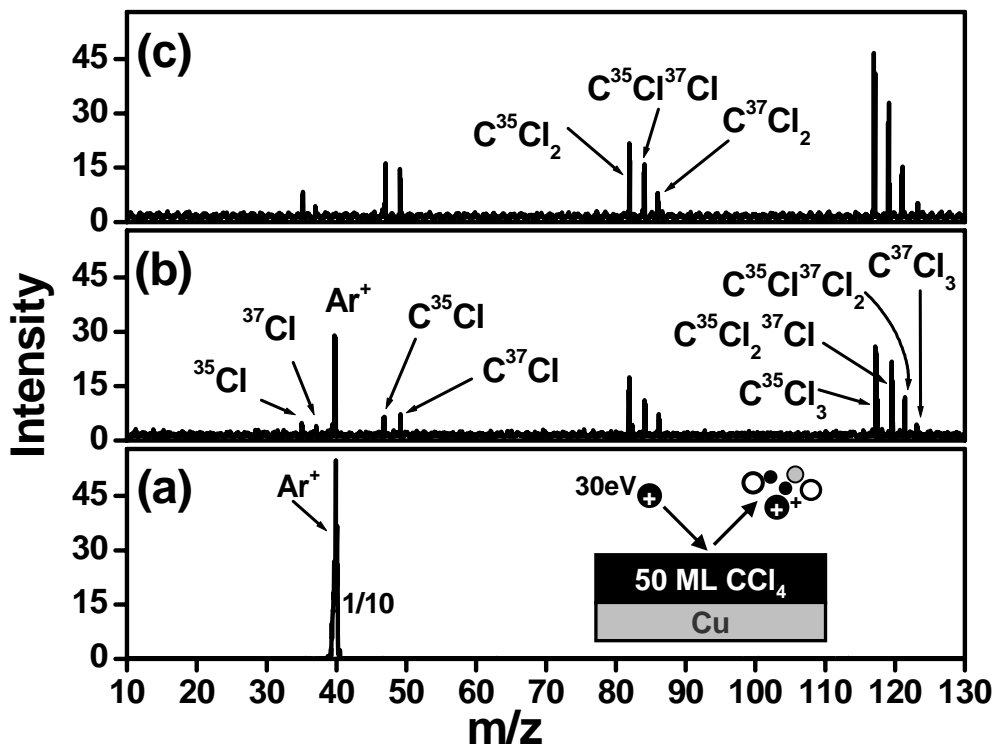


Figure S2: Chemical sputtering spectra of 50 ML CCl_4 at three different collision energies; (a) 3 eV, (b) 30 eV and (c) 60 eV. Increase in intensity of the sputtered ions is observed as the collision energy is increased from 30 to 60 eV.

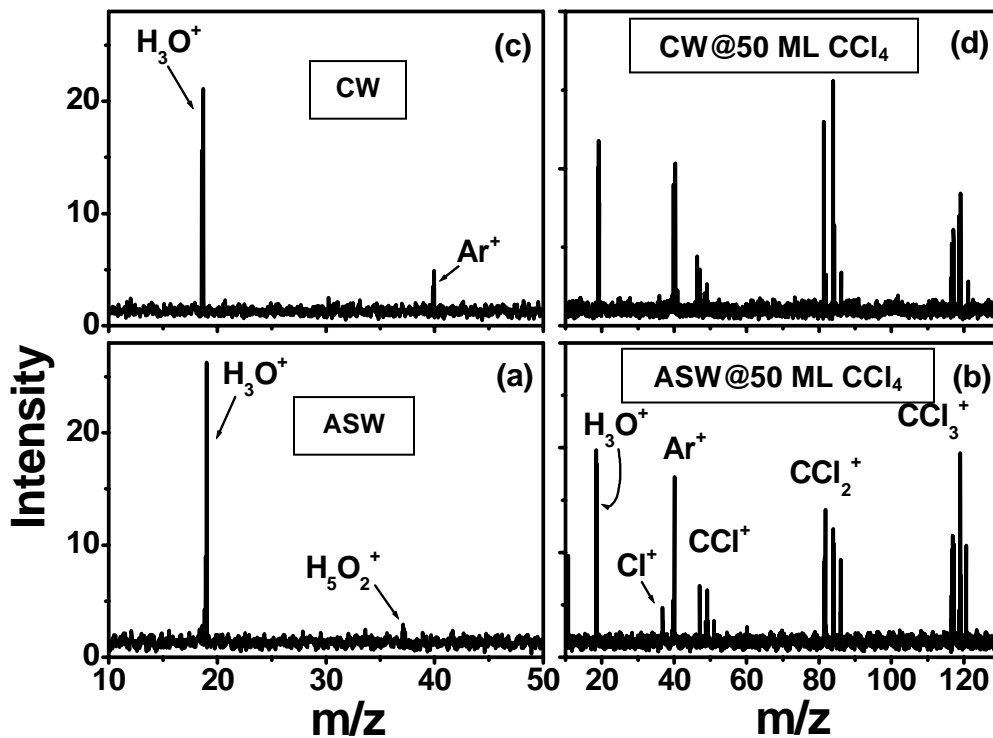


Figure S3. Spectra showing the diffusive mixing of H₂O molecules through CCl₄ overlayers. (a) and (b) are the spectra from ASW and ASW@CCl₄, respectively. The presence of H₃O⁺ peak after depositing CCl₄ shows the transport of H₂O through CCl₄ overlayers. Sputtering spectra from CW and CW@CCl₄ are given in (c) and (d), respectively. Differences between ASW and CW systems are insignificant.

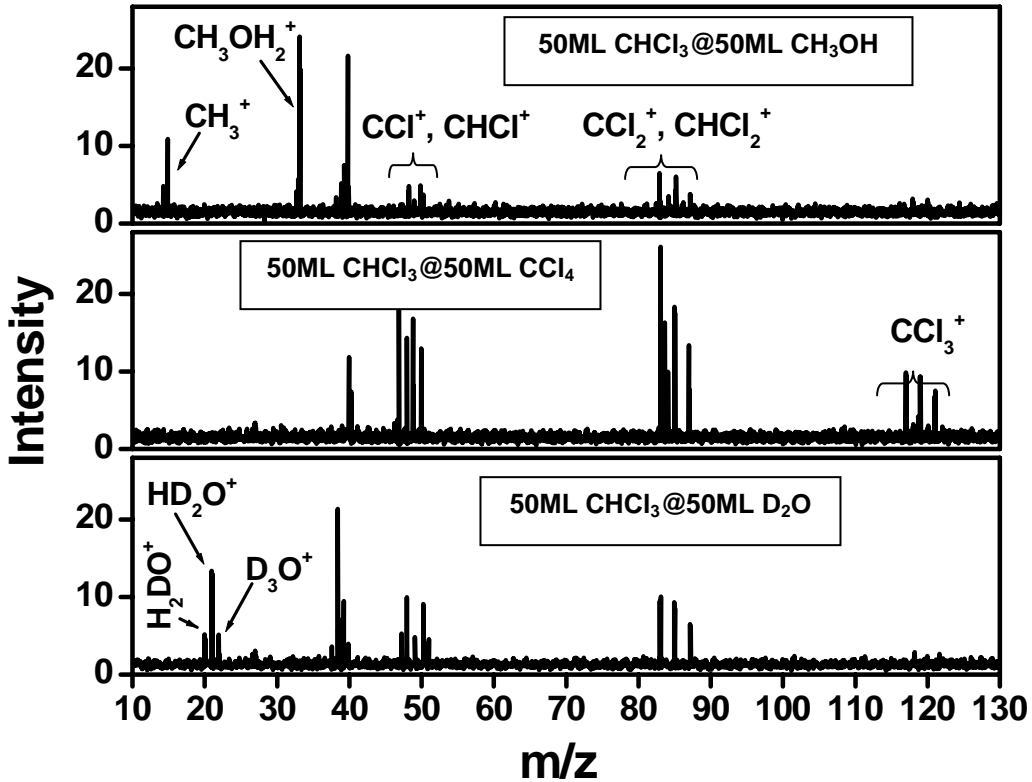


Figure S4. Spectra showing the diffusive mixing of 50 ML of CHCl₃ with other molecular solids (a) D₂O, (b) CCl₄ and (d) CH₃OH (thickness is 50 ML for each molecular solid). Collision energy is 30 eV and the projectile is Ar⁺ ion. All spectra contain sputtering features of CHCl₃ and thus it is evident that CHCl₃ is undergoing diffusive mixing with D₂O, CCl₄ and CH₃OH. The miscibility of CHCl₃ in CCl₄ is more compared to the other two, as seen from the more intense CHCl₃ features in this case.

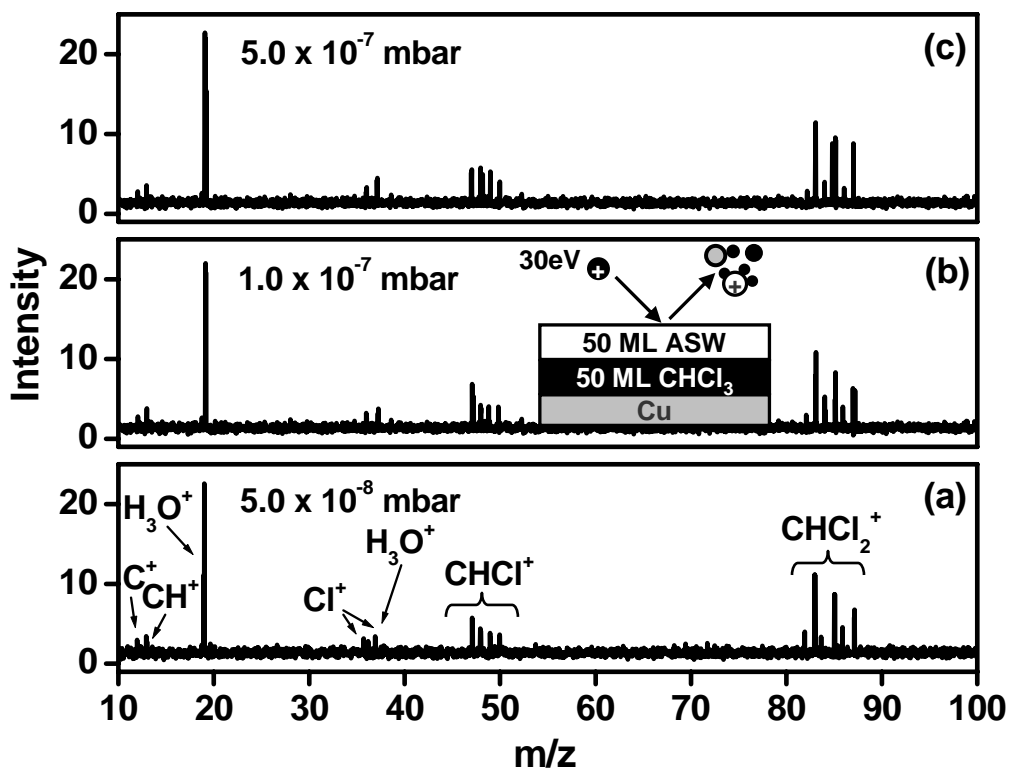


Figure S5. (a), (b) and (c) are the Ar^+ induced chemical sputtering spectra from 50 ML CHCl_3 @50 ML ASW surface where upper ASW layer is prepared at three different deposition pressures. It is clear from the intensities of the sputtered peaks that the composition of the surface did not vary with the change in deposition rate of ASW and the thickness of the ASW layer is comparable.