Supporting information

# Low Energy Ion Scattering Investigation on n-Butanol-Ice System in the Temperature Range of 110 -150 K

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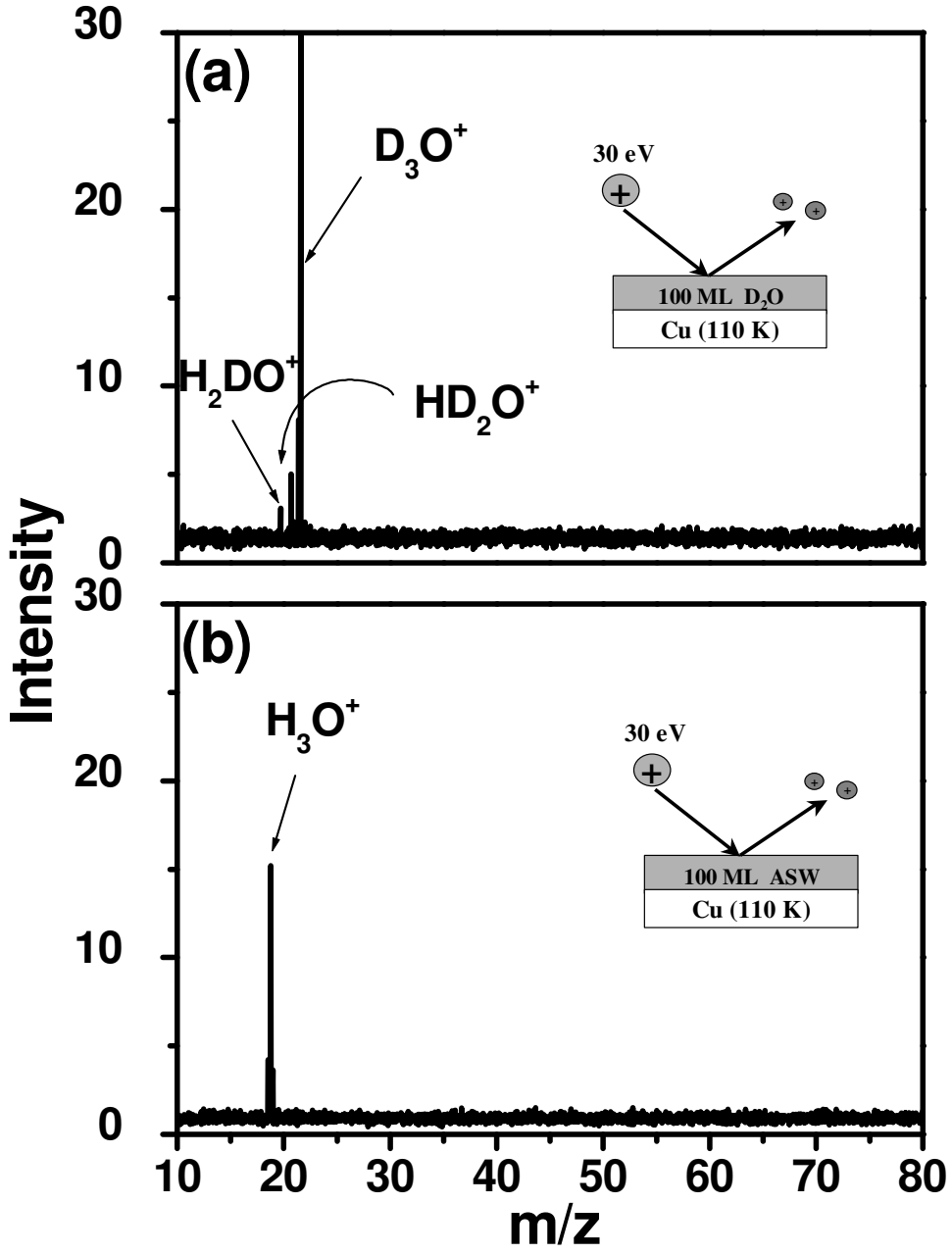


**Figure S1:** Mass spectra corresponding to 30 eV collisions of $Ar^+$ at (a) 100 ML $D_2O$ and (b) 100 ML ASW. The proton exchanged ions in a ($HD_2O^+$ and $H_2DO^+$) are due to the sample itself. The peak at m/z 20 in (a) is assigned to $H_2DO^+$ as $D_2O^+$ is unlikely in the mass spectrum induced by low energy ion collisions. We see only $H_3O^+$ and not $H_2O^+$ in any of our experiments with $H_2O$.

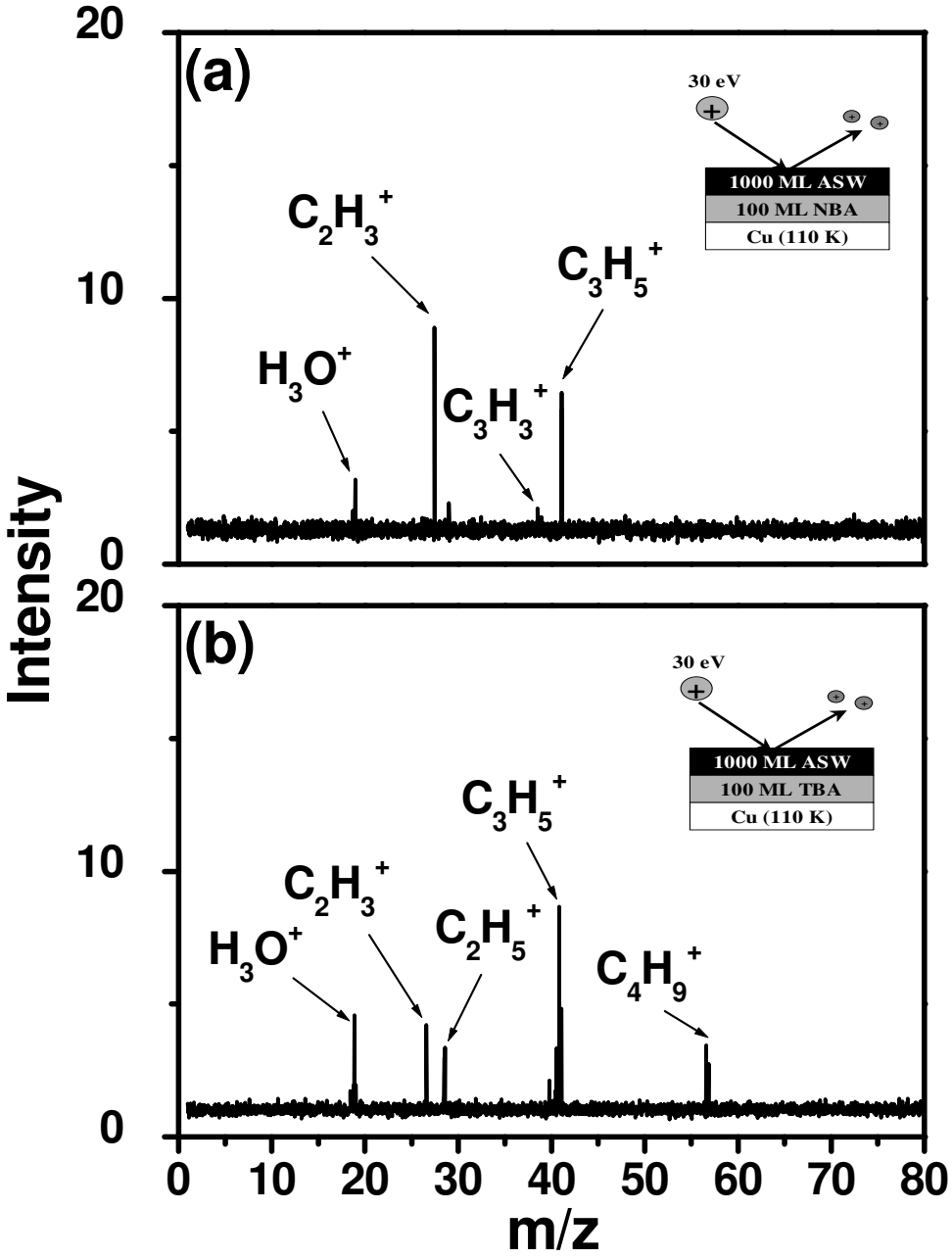


**Figure S2:** Chemical sputtering spectra of (a) 100 ML NBA@1000 ML ASW, and (b) 100 ML TBA@1000ML ASW.

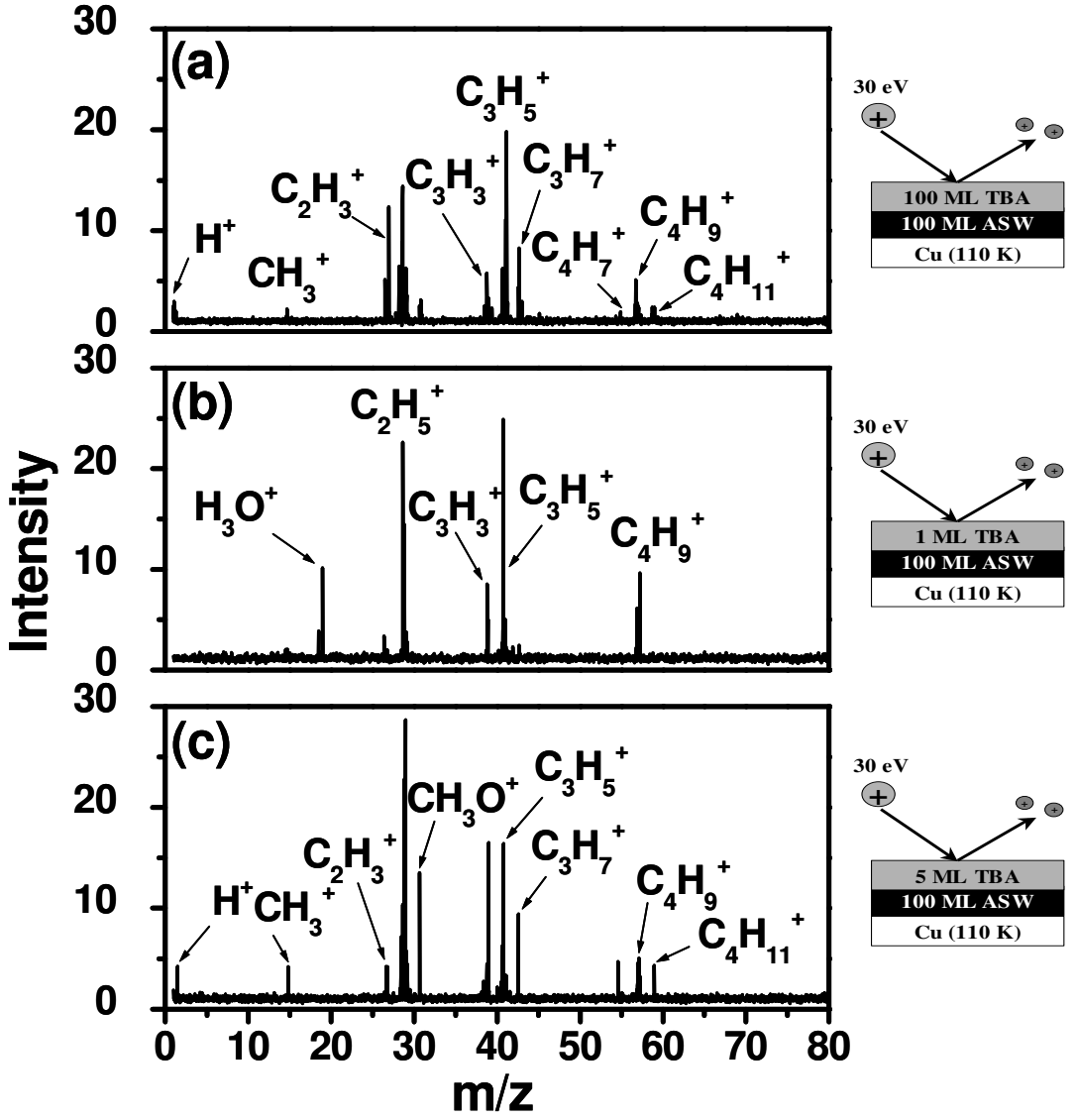


**Figure S3:** Chemical sputtering spectra of (a) 100 ML ASW@100 ML TBA, (b) 100 ML ASW@1 ML TBA, and (c) 100 ML ASW@5 ML TBA.

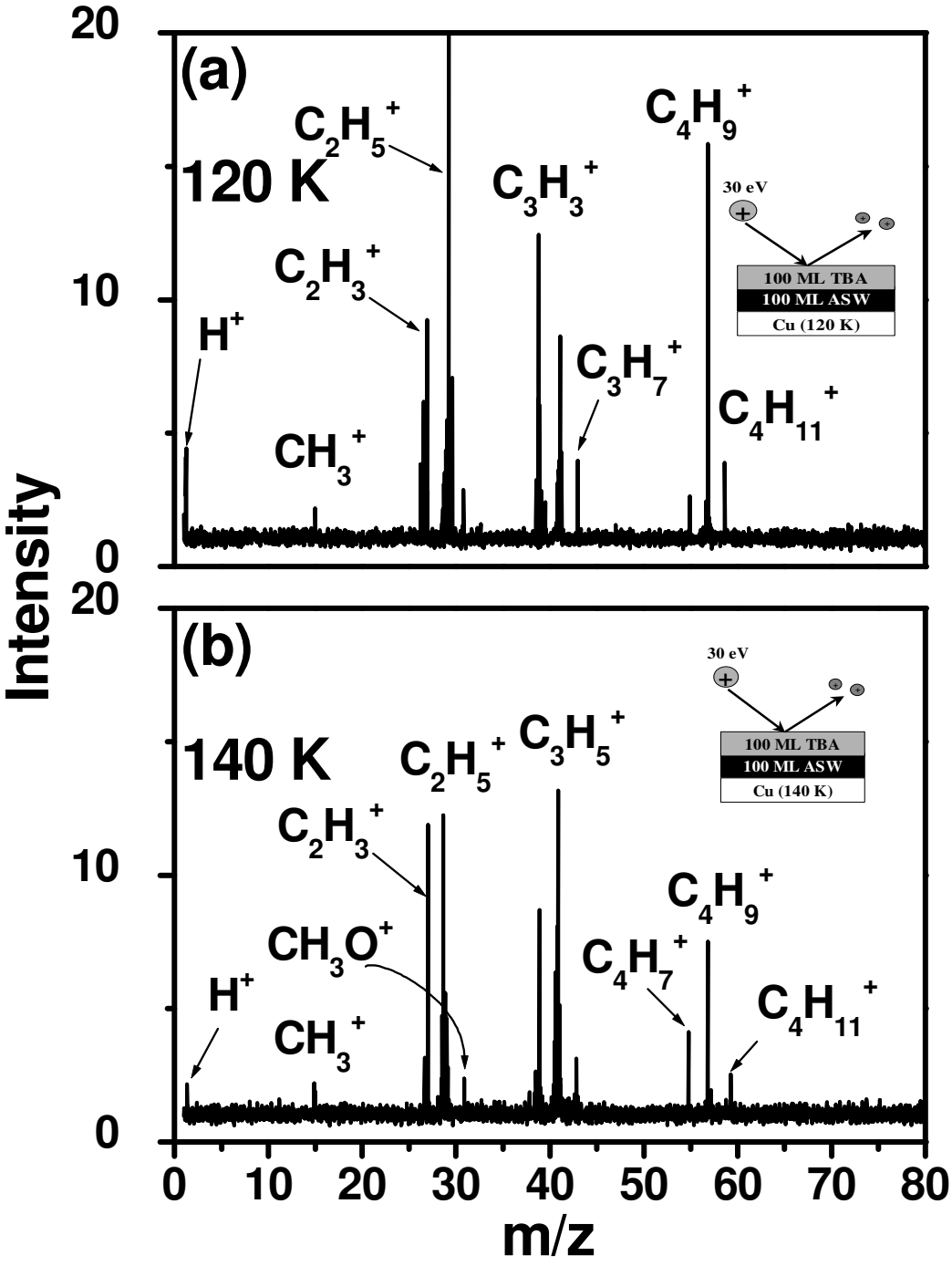


**Figure S4:** Chemical sputtering spectra of 100 ML ASW@100 ML TBA at different substrate temperatures, (a) 120 K and (b) 140 K.

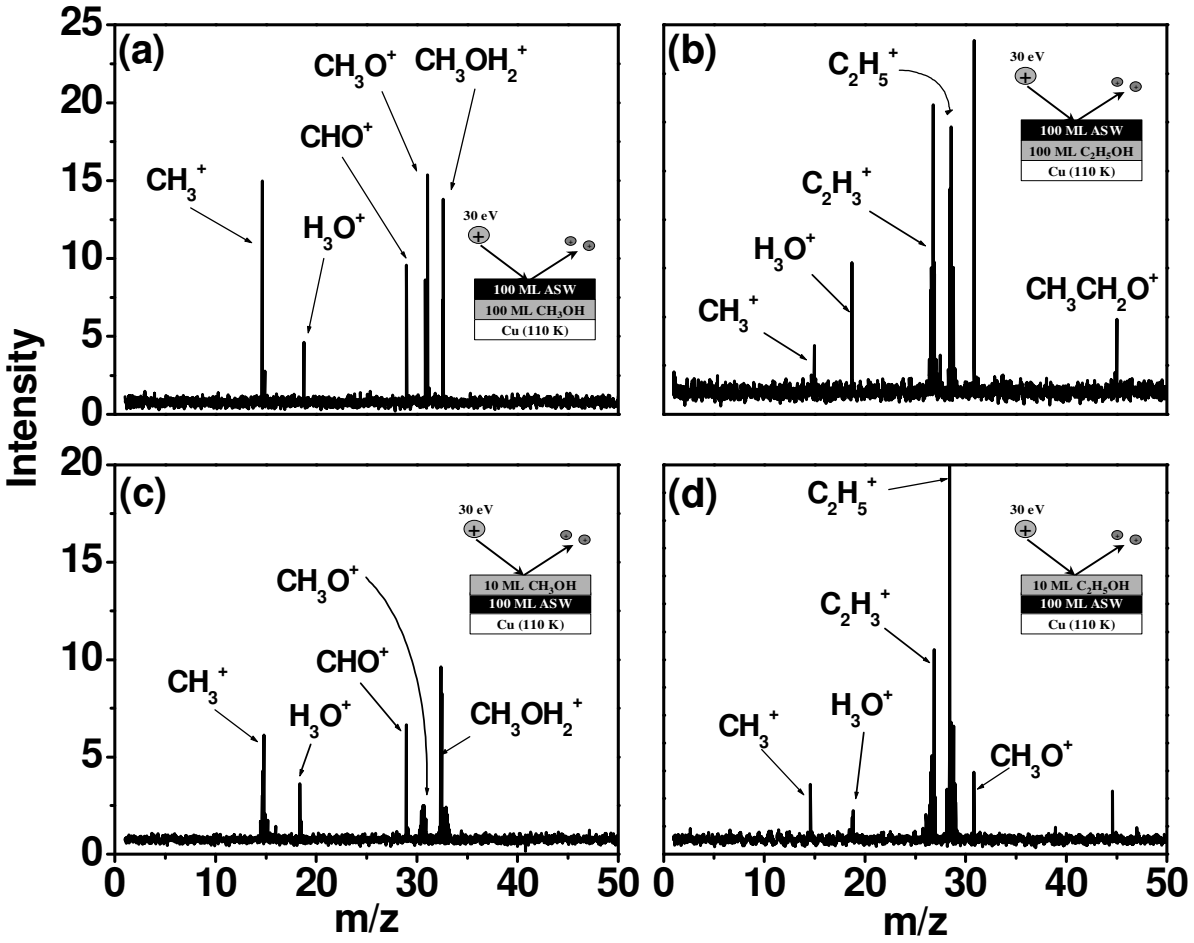


**Figure S5:** Chemical sputtering spectra of (a) 100 ML $CH_3OH$ @100 ML ASW, (b) 100 ML $C_2H_5OH$ @100 ML ASW, (c) 100 ML ASW@10 ML $CH_3OH$, and (d) 100 ML ASW@10 ML $C_2H_5OH$.

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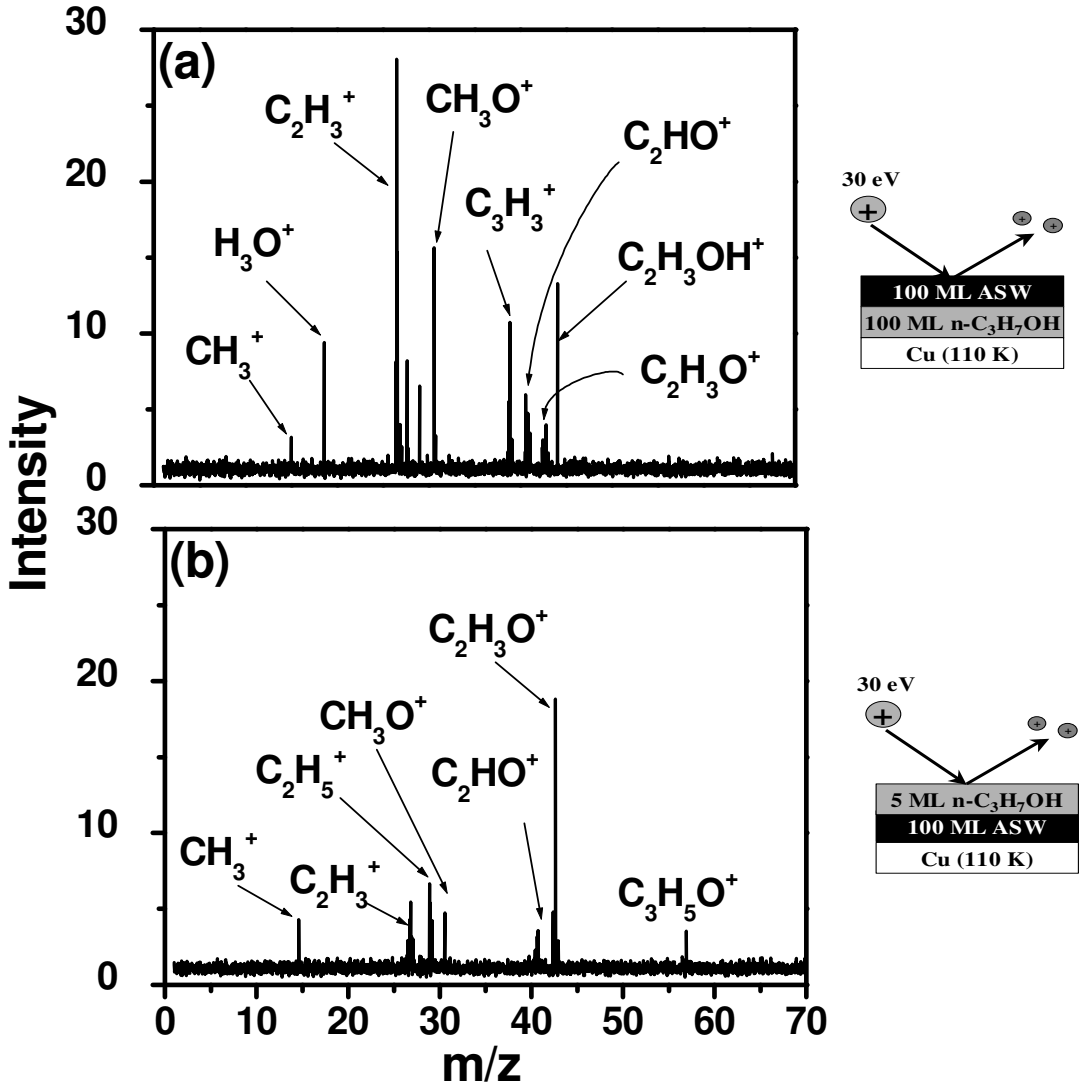


**Figure S6:** Chemical sputtering spectra of (a) 100 ML $C_3H_7OH$@100 ML ASW and (b) 100 ML ASW@5 ML $C_3H_7OH$.