

## Supporting information

# Distinguishing Amorphous and Crystalline Ice by Ultralow Energy Collisions of Reactive Ions

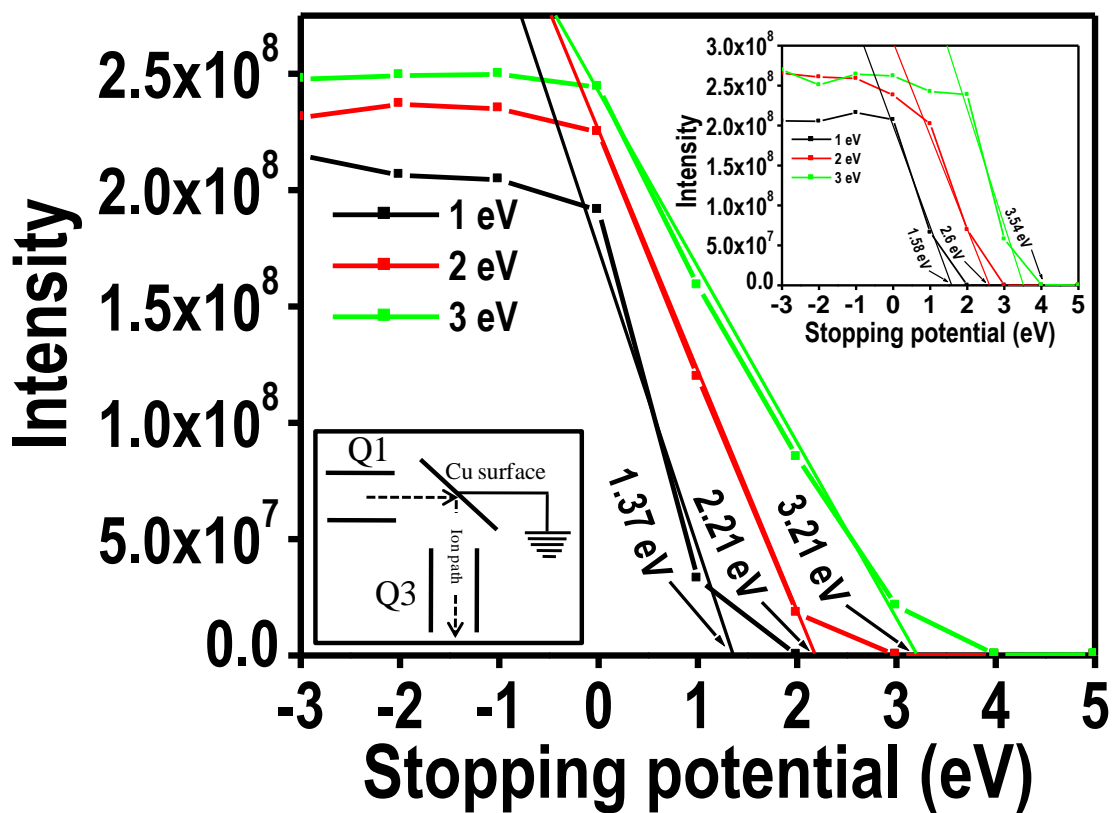
*Soumabha Bag, Radha Gobinda Bhui, and T. Pradeep\**

DST Unit of Nanoscience (DST UNS), Department of Chemistry, Indian Institute of Technology  
Madras, Chennai- 600036, India.

\*Corresponding author: Fax: + 91-44 2257-0545

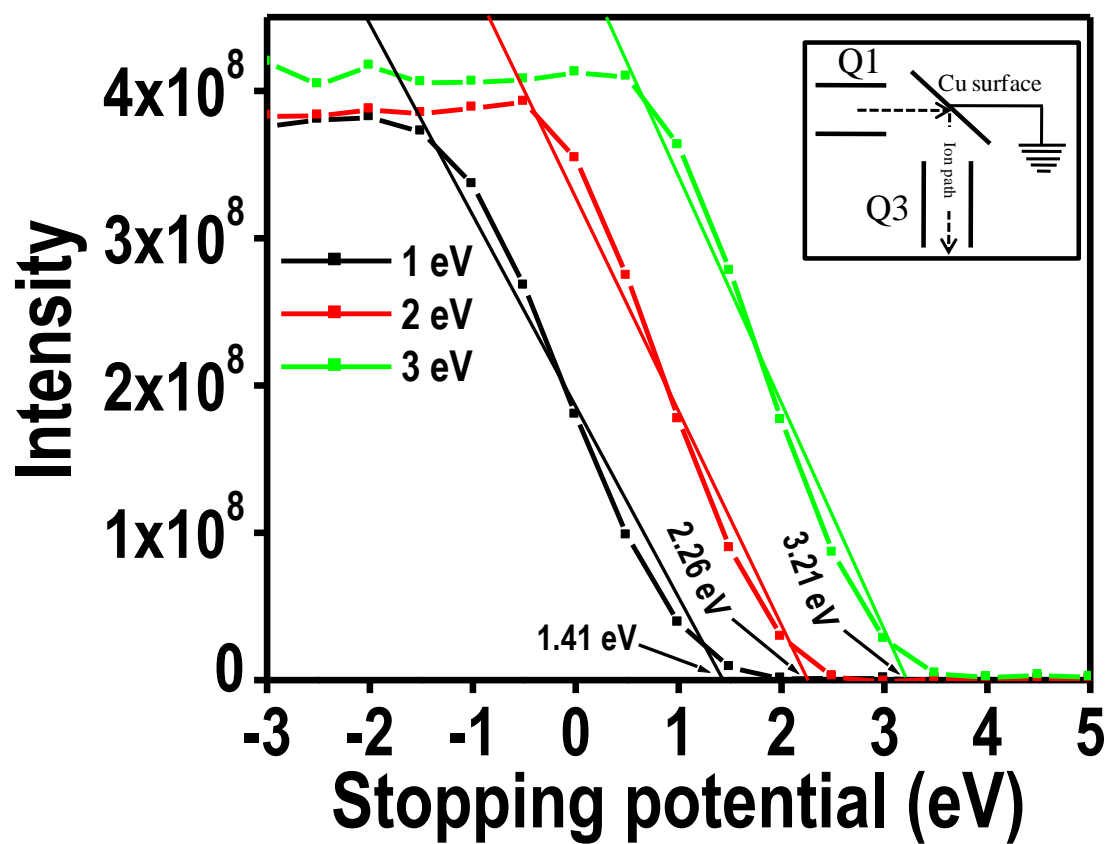
E-mail: [pradeep@iitm.ac.in](mailto:pradeep@iitm.ac.in)

Supporting information 1



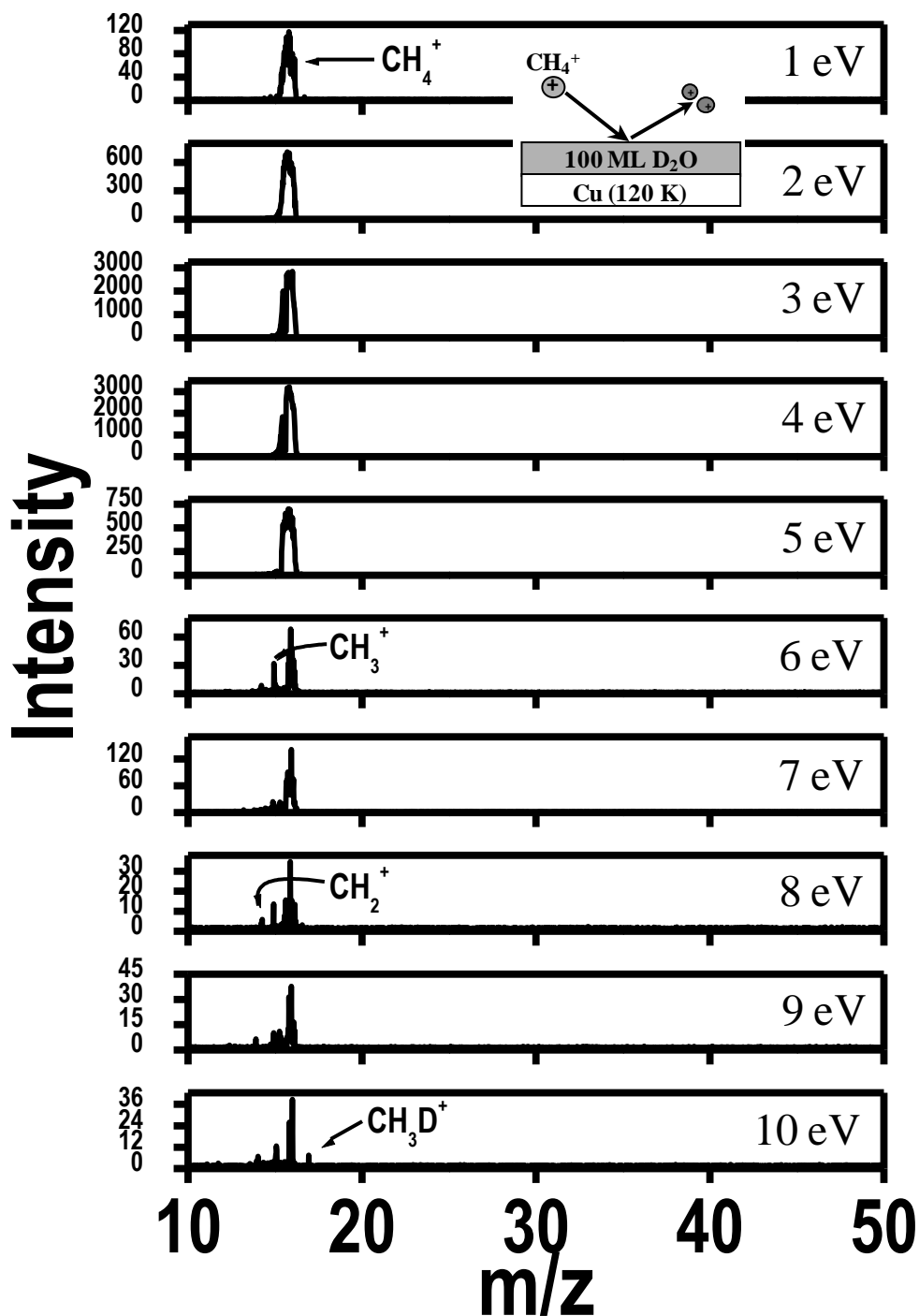
**Figure S1.** Stopping potential experiment of  $\text{CH}_3^+$  performed at Q1. Inset shows the results of the same experiment performed at Q3. A schematic of the experiment is shown in another inset.

Supporting information 2



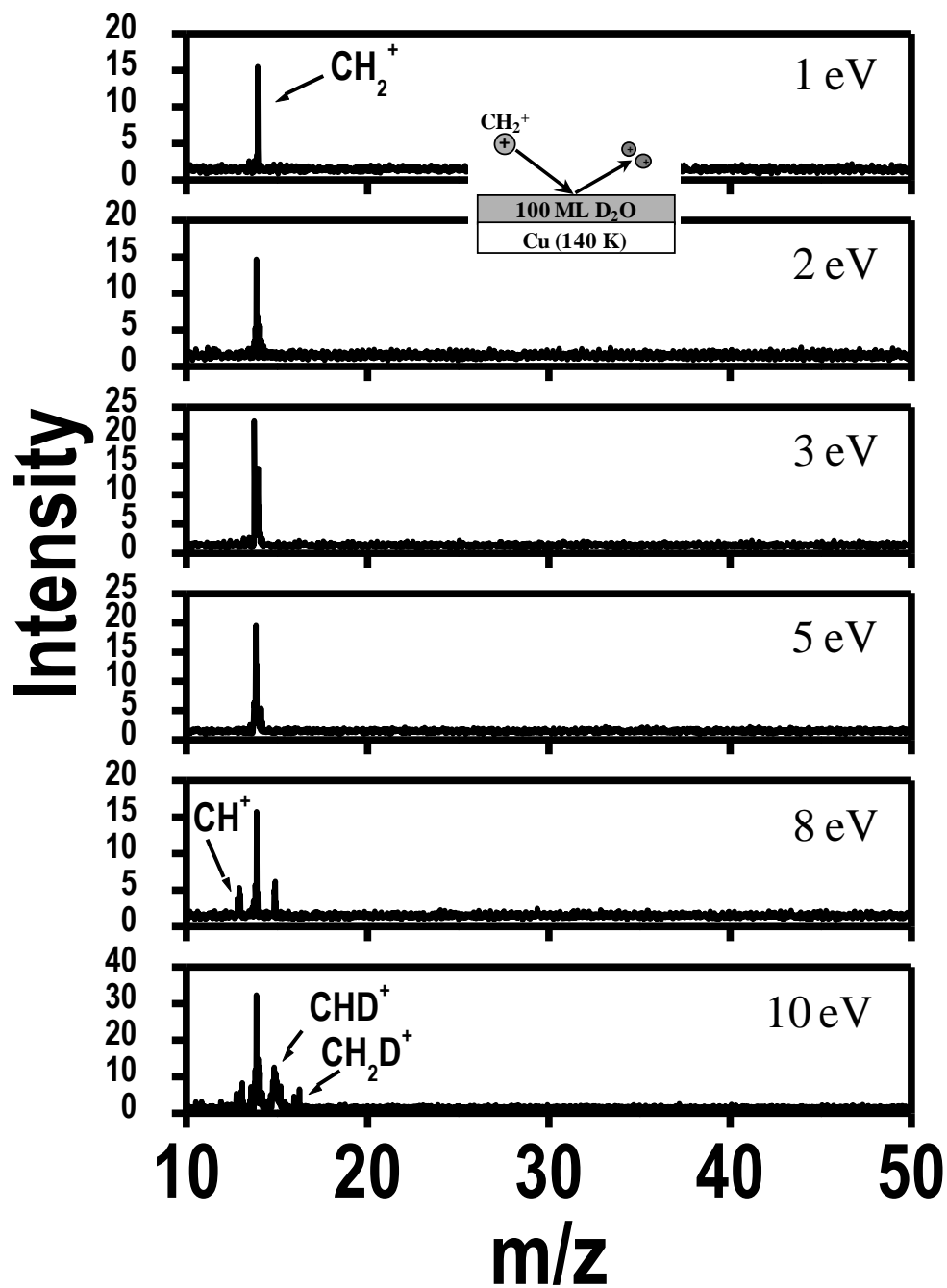
**Figure S2.** Stopping potential experiment of  $\text{CH}_4^+$  performed at Q1. Inset shows the scheme of the experiment.

Supporting information 3



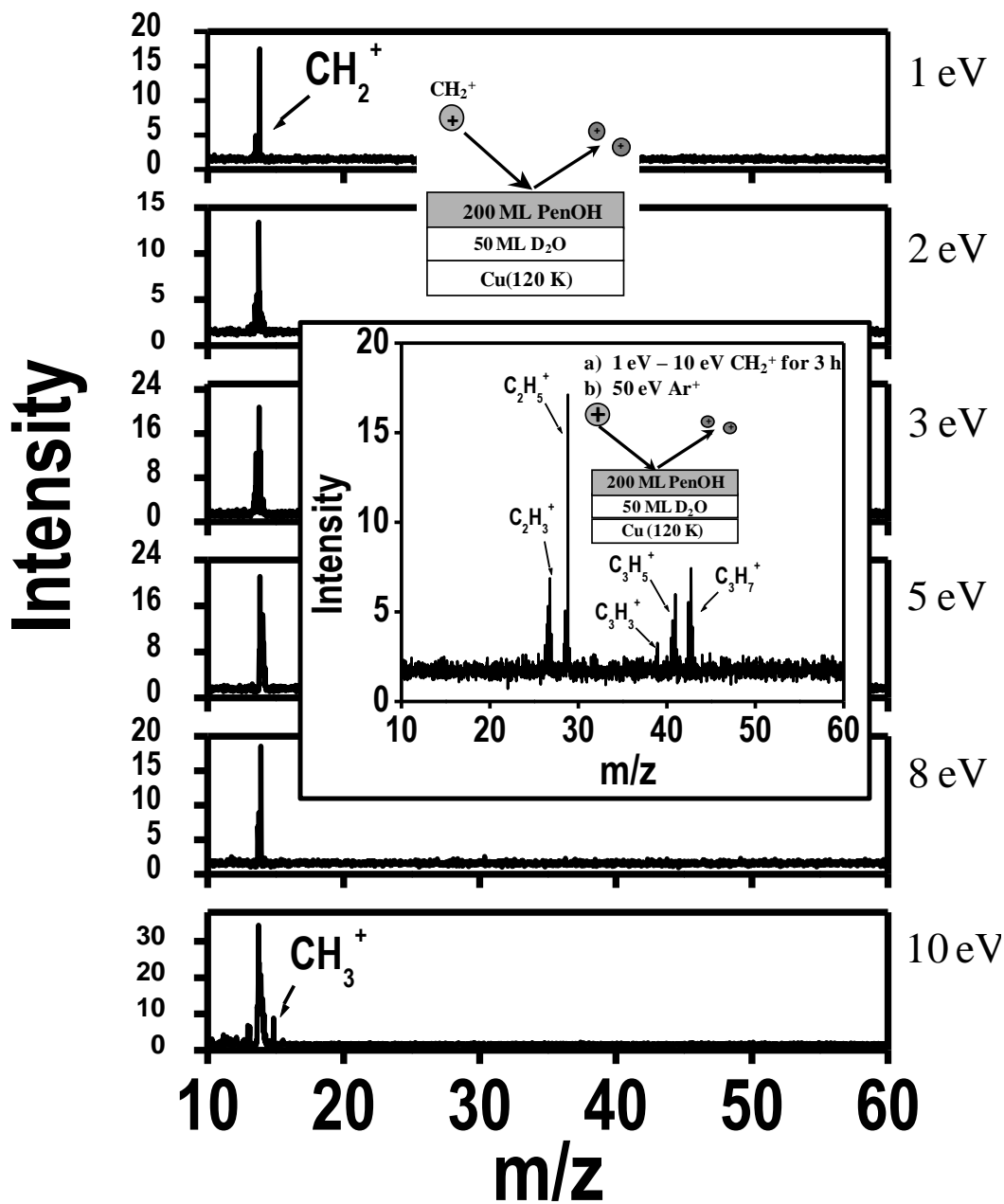
**Figure S3.** Mass spectra observed upon the collision varying energy of  $\text{CH}_4^+$  on 100 ML ASW ( $\text{D}_2\text{O}$ ) generated at 120 K.

Supporting information 4



**Figure S4:** Mass spectra observed after collision of varying energy  $CH_2^+$  projectile on crystalline ice ( $D_2O$ ) made after annealing of the amorphous ice layer.

Supporting information 5



**Figure S5:** Mass spectra recorded upon collision of ultralow energy (1-10 eV)  $\text{CH}_2^+$  ion on condensed 1-pentanol grown on amorphous ice ( $\text{D}_2\text{O}$ ).  $\text{CH}_2^+$  ion colliding with 1, 2, 3, 5, 8, 10 eV kinetic energy is shown here. Inset shows the sputtering spectra upon the collision of 50 eV  $\text{Ar}^+$  ion on the substrate.