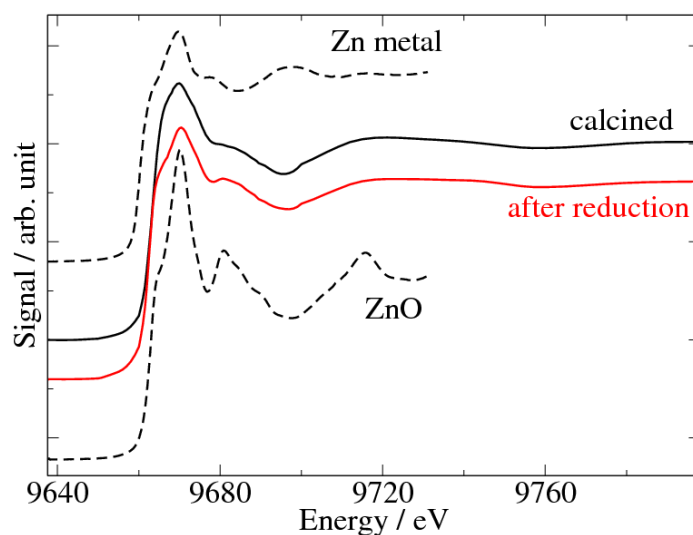
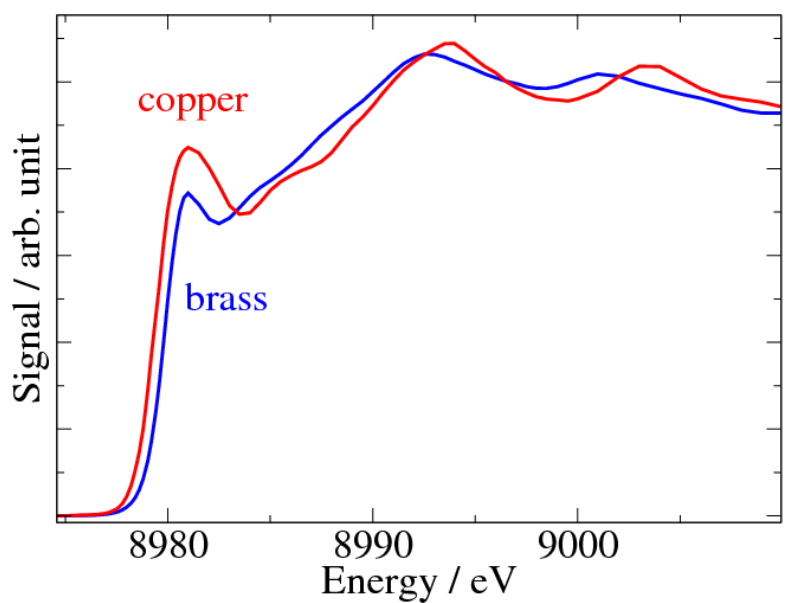


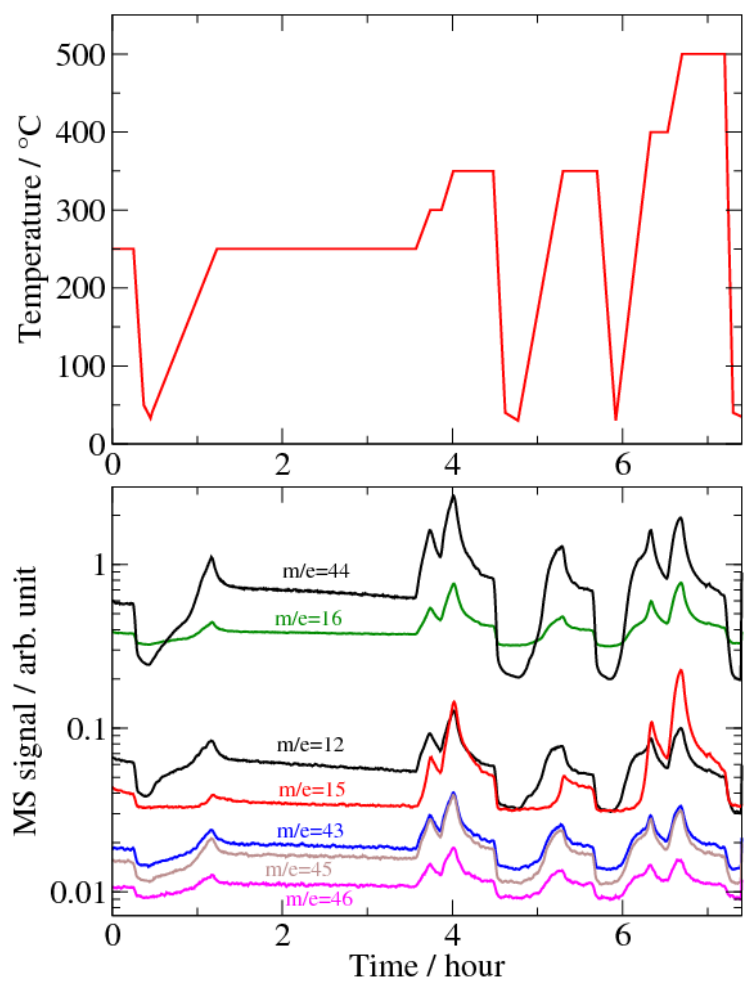
Evolution of Cu K-edge HERFD XAS during reduction of the catalyst precursor in the reaction mixture.



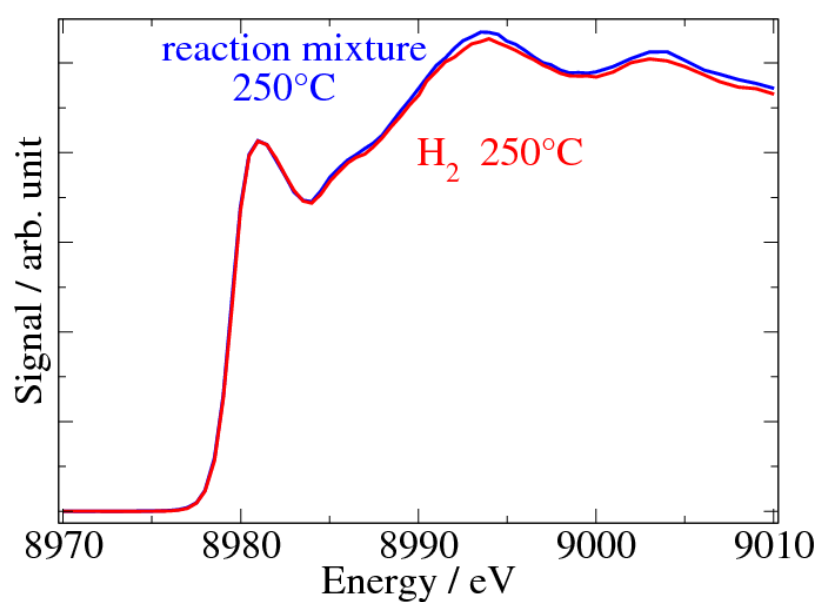
Zn K-edge XANES of the catalyst precursor before and after reduction in hydrogen. Spectra of Zn metal and ZnO are shown for comparison.



Cu K-edge HERFD XAS of copper metal and brass



Temperature programmed desorption in argon, after the reaction.



Cu K-edge HERFD XAS of the catalyst reduced in reaction mixture (blue) or hydrogen (red)