Supporting Information

Fast track to nanomaterials: Microwave assisted synthesis in ionic liquid media

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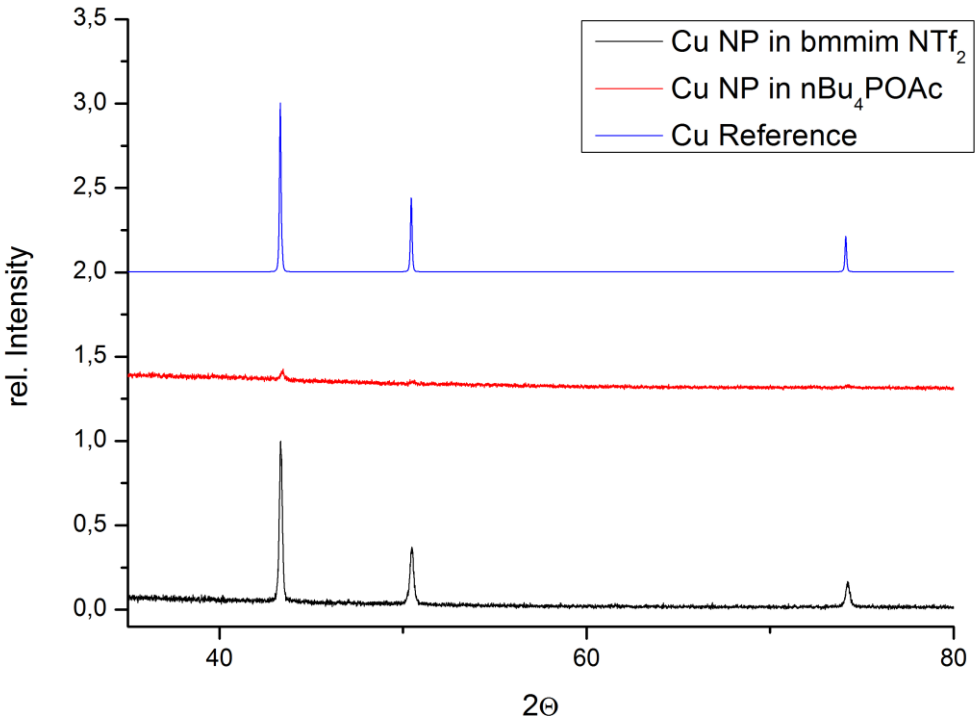
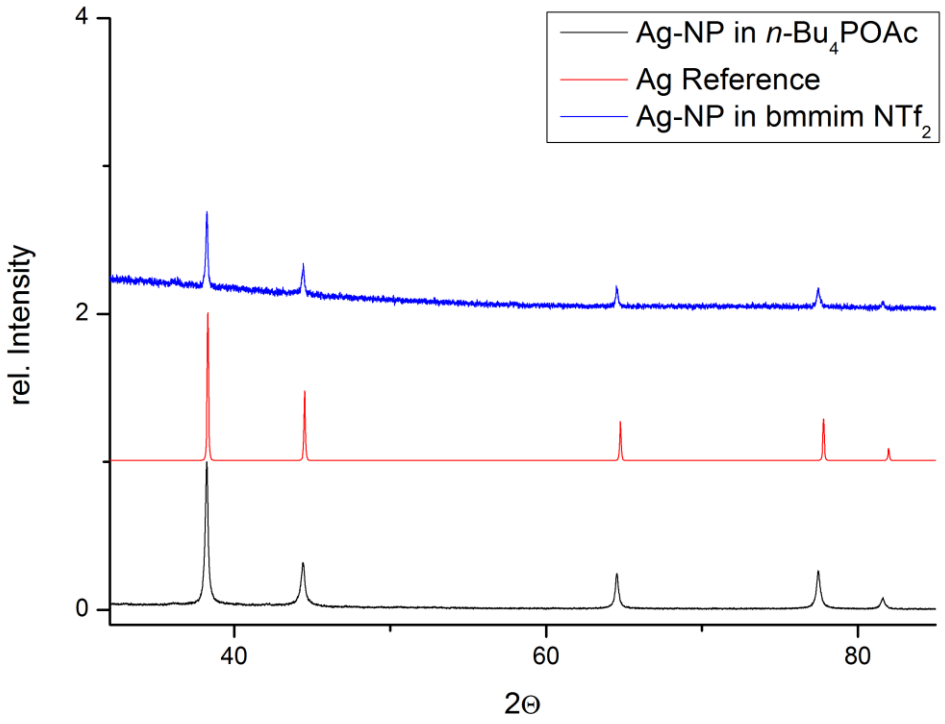
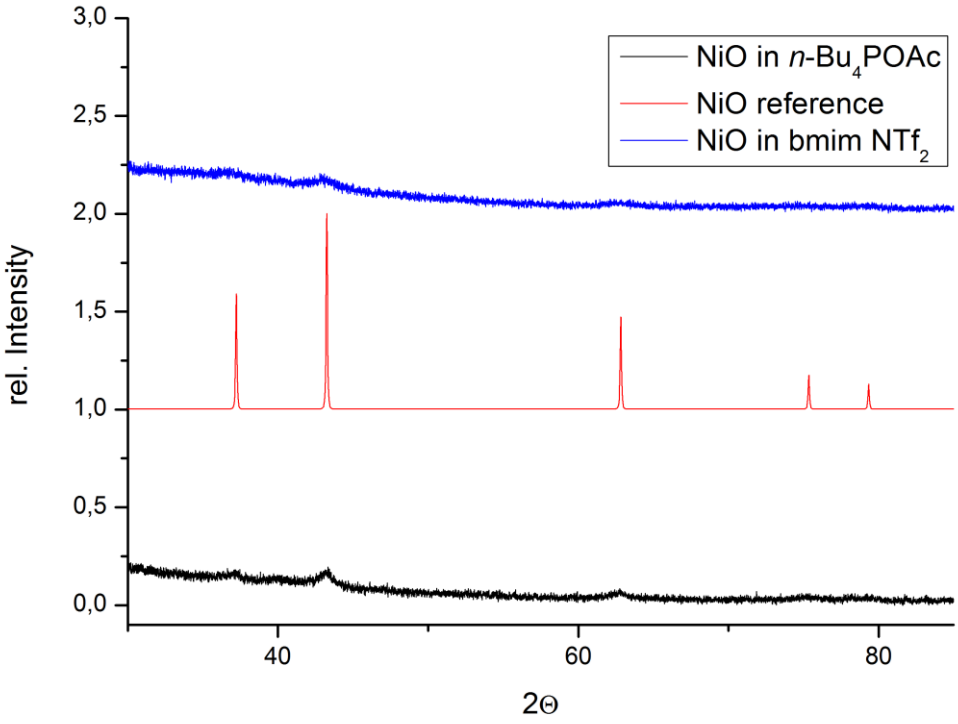


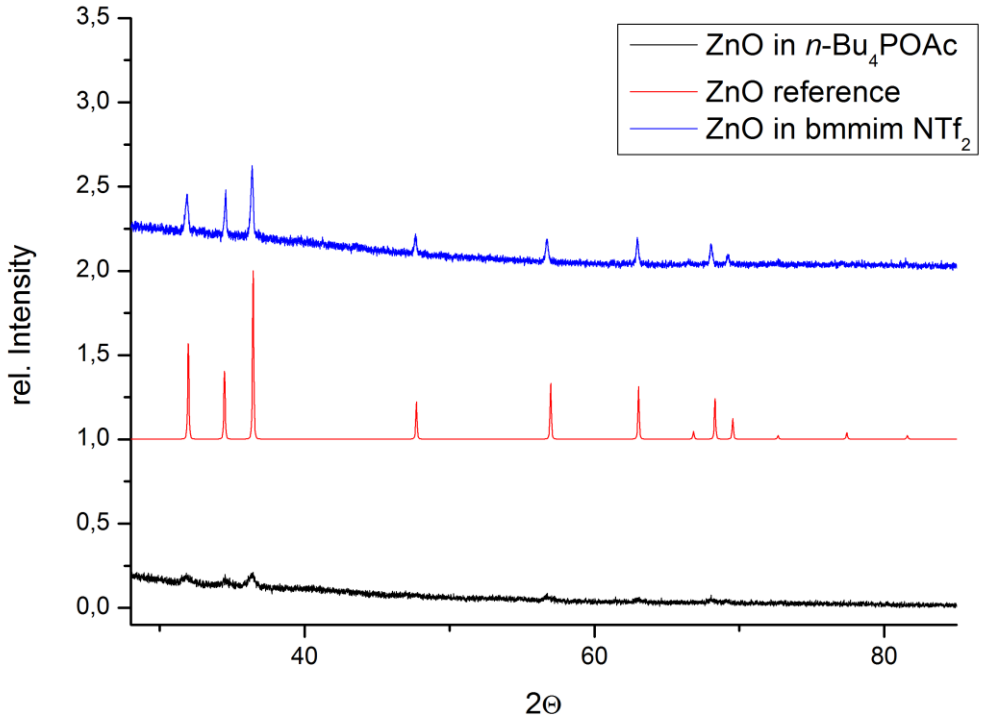
SI Figure 1: XRD-pattern of copper nanoparticles in *n*-Bu_4POAc (red) and bmmim NTf_2 (black).



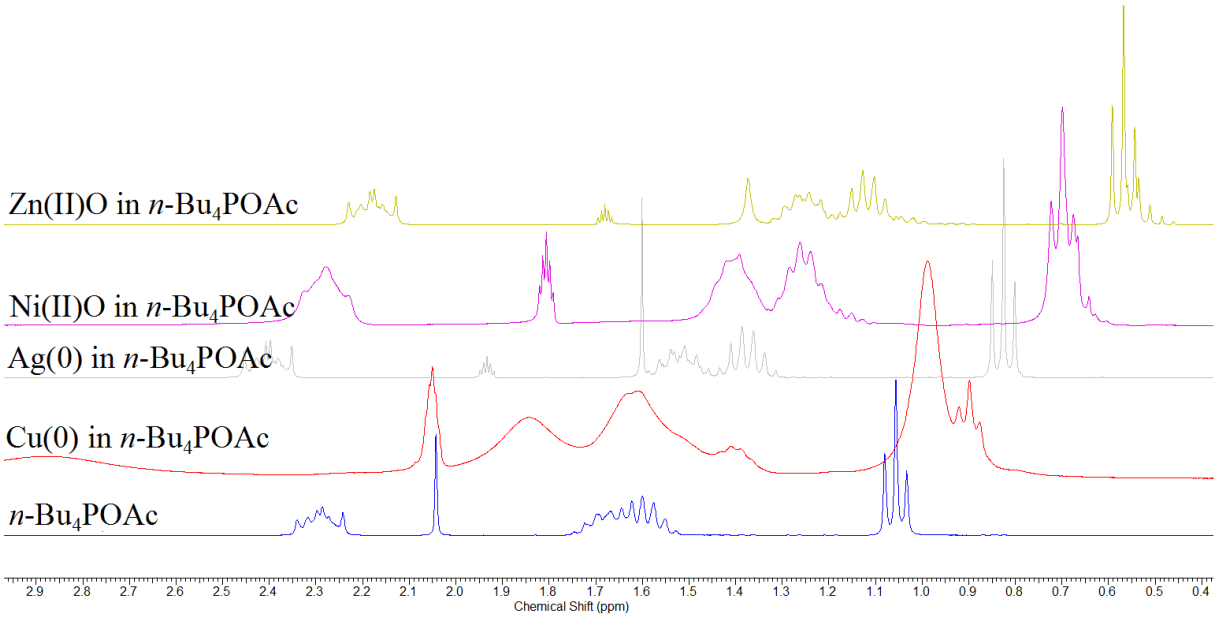
SI Figure 2: XRD-pattern of Ag nanoparticles in *n*-Bu_4POAc (black) and bmmim NTf_2 (blue).



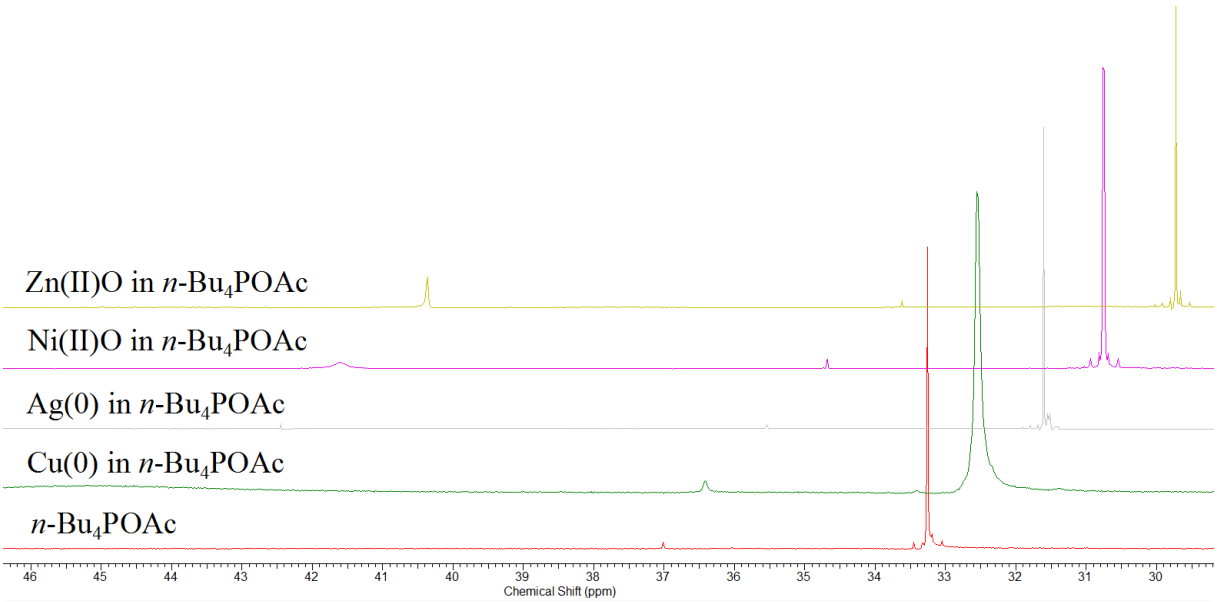
SI Figure 3: XRD-pattern of NiO nanoparticles in *n*-Bu_4POAc (black) and bmim NTf_2 (blue).



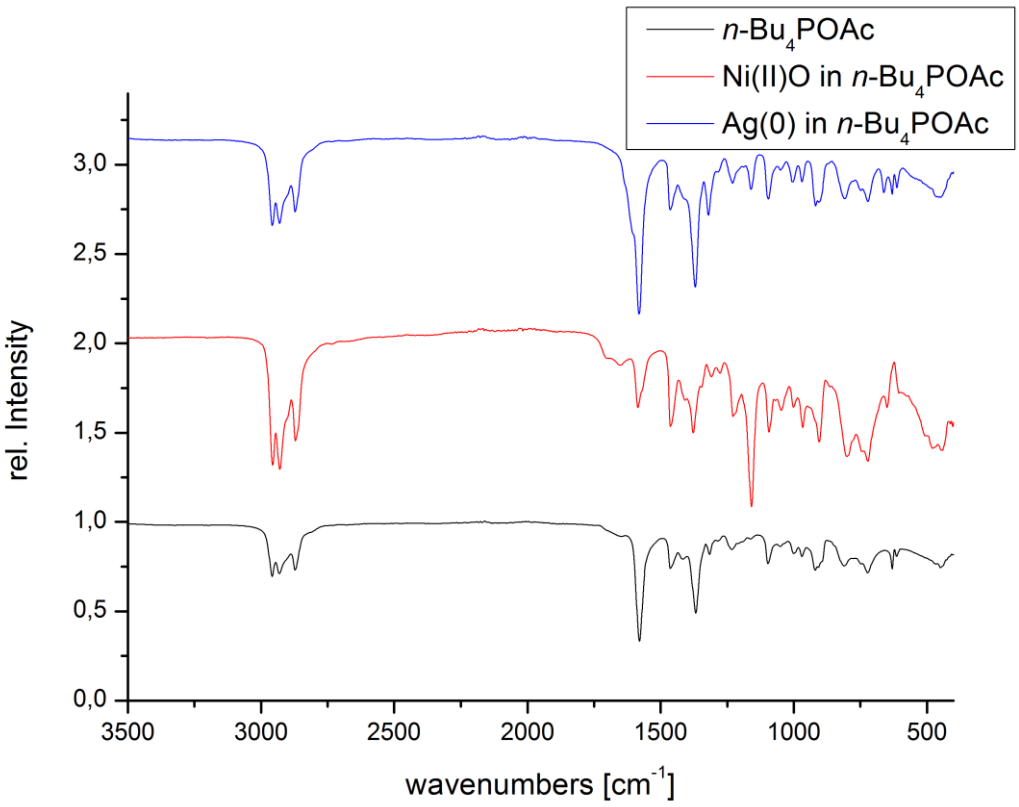
SI Figure 4: XRD-pattern of ZnO nanoparticles/nanorods in *n*-Bu_4POAc (black) and bmmim NTf_2 (blue).



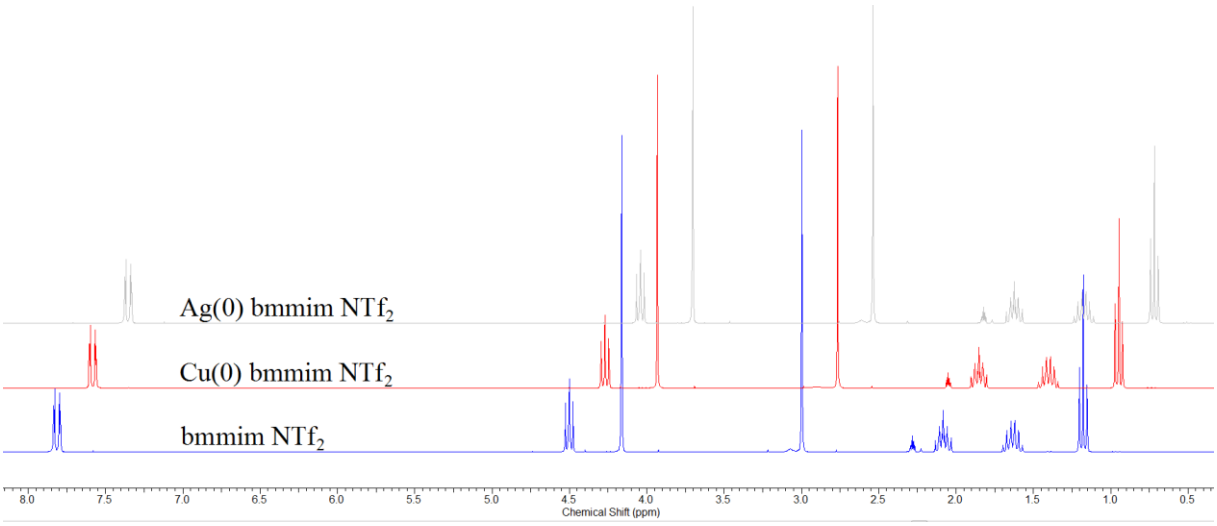
SI Figure 5: ^{1}H-NMR of the reaction mixture after the synthesis of Cu- (red), Ag- (grey), NiO- (pink) and ZnO (yellow) nanoparticles (offset: 0.15 ppm). A reference spectrum of *n*-Bu_4POAc (blue) is added.



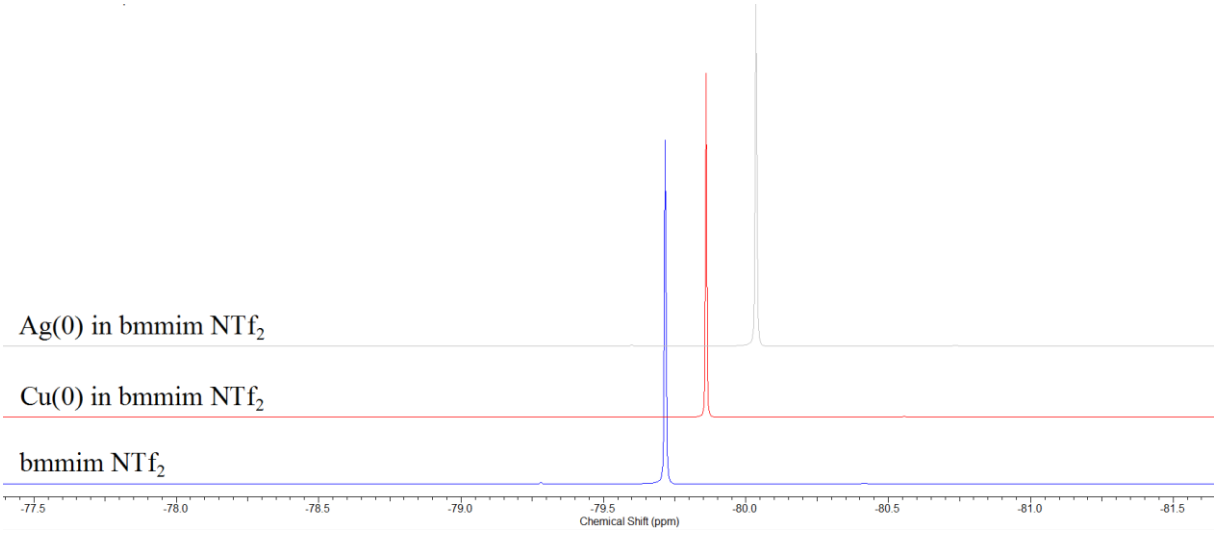
SI Figure 6: ^{31}P-NMR of the reaction mixture after the synthesis of Cu- (red), Ag- (grey), NiO- (pink) and ZnO (yellow) nanoparticles (offset: 1.0 ppm). A reference spectrum of *n*-Bu$_4$POAc (blue) is added.



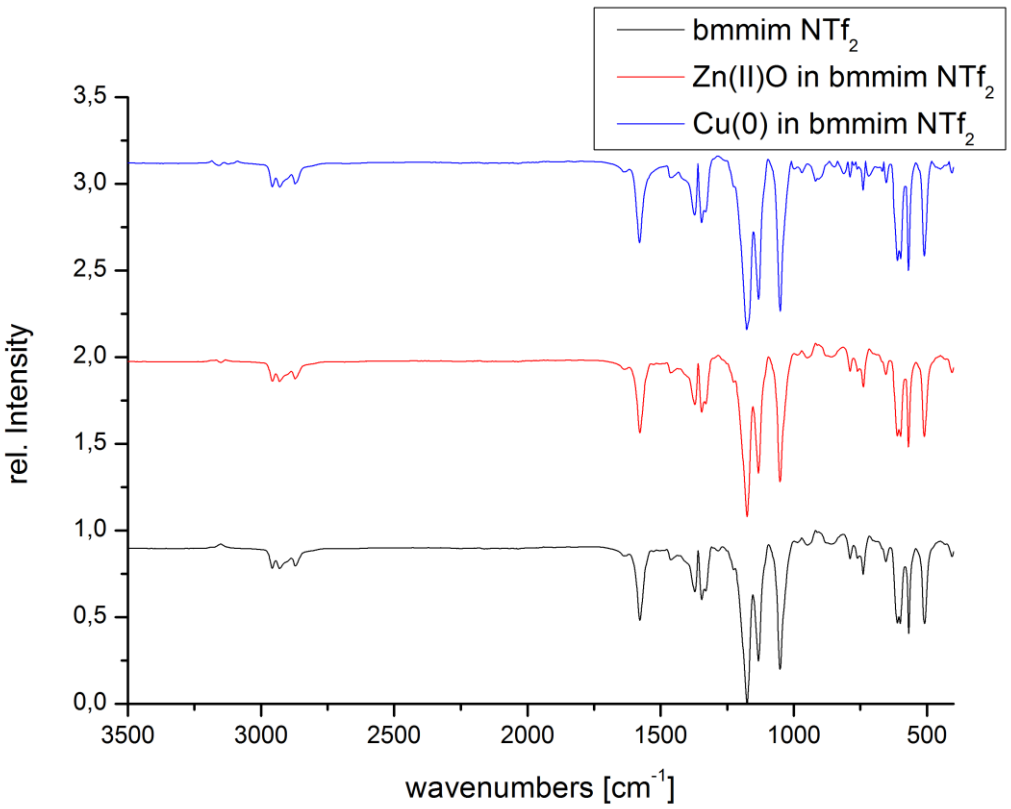
SI Figure 7: IR-spectra of pure *n*-Bu$_4$POAc (black) and the reaction mixtures of Ag- (blue) and NiO (red) nanoparticles in *n*-Bu$_4$POAc.



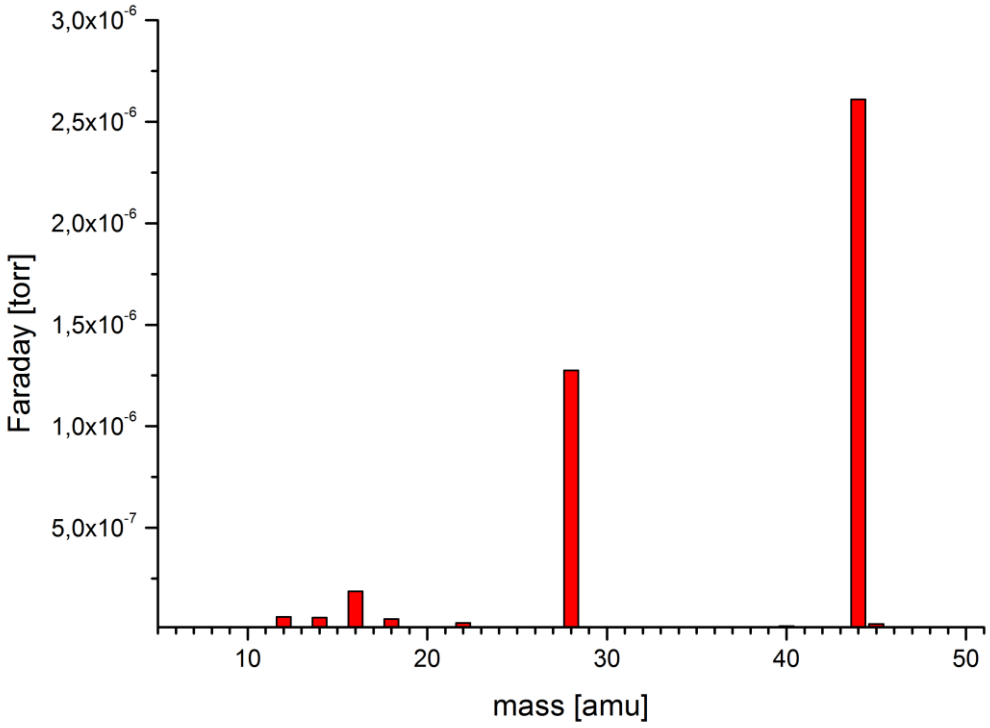
SI Figure 8: ^{1}H-NMR of selected reaction mixtures after the synthesis of Cu- (red) and Ag- (grey) nanoparticles (offset: 0.5 ppm). A reference spectrum of bmmim NTf_2 (blue) is added.



SI Figure 9: ^{19}F-NMR of selected reaction mixtures after the synthesis of Cu- (red) and Ag- (grey) nanoparticles (offset: 0.25 ppm). A reference spectrum of bmmim NTf_2 (blue) is added.



SI Figure 10: IR-spectra of pure bmmim NTf_2 (black) and the reaction mixtures of ZnO (red) and Cu(0) (blue) nanoparticles in bmmim NTf_2.



SI Figure 11: Gas-phase mass spectrogram of volatile compounds of the reductive decomposition of copper carbonate in *n*-Bu_4POAc.

Setup for gas-phase analyses

Experiments for gas phase analysis at elevated pressure were performed in a stainless steel autoclave purchased from *Carl-Roth*® with a direct connection to the MS-spectrometer via the mass flow controller. All reactions for the online gas-phase mass-spectrometry were carried out in dry 20 ml screw cap vials equipped with a Teflon stirring bar and a perforated butyl/rubber septum. In comparison to the standard procedure the reaction batch was doubled in order to yield a significant amount of gaseous products.

Sample preparation for TEM analysis

A droplet of the nanoparticle dispersion embedded in IL was diluted with 2 ml acetone and a slight amount of this dispersion was placed in a holey carbon-coated copper grid. Particle size distributions were determined from the digital images obtained with a CCD camera. The NPs diameter was estimated from ensembles of 400 particles (800 counts) chosen in arbitrary areas of the enlarged micrographs. The diameters of the particles in the micrographs were measured using the software Lince Linear Intercept 2.4.2.

Sample preparation for XRD analysis

The nanoparticle dispersion was directly placed between two plastic disks as before transmission measurement. In case of a low viscosity the dispersion was dried at 40 °C or at room-temperature under reduced pressure (10^{-2} mbar).