

# **Recycling of bonded NdFeB permanent magnets using ionic liquids**

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**Electronic Supplementary Information (ESI)**

## Infrared analysis results of bonded NdFeB magnets

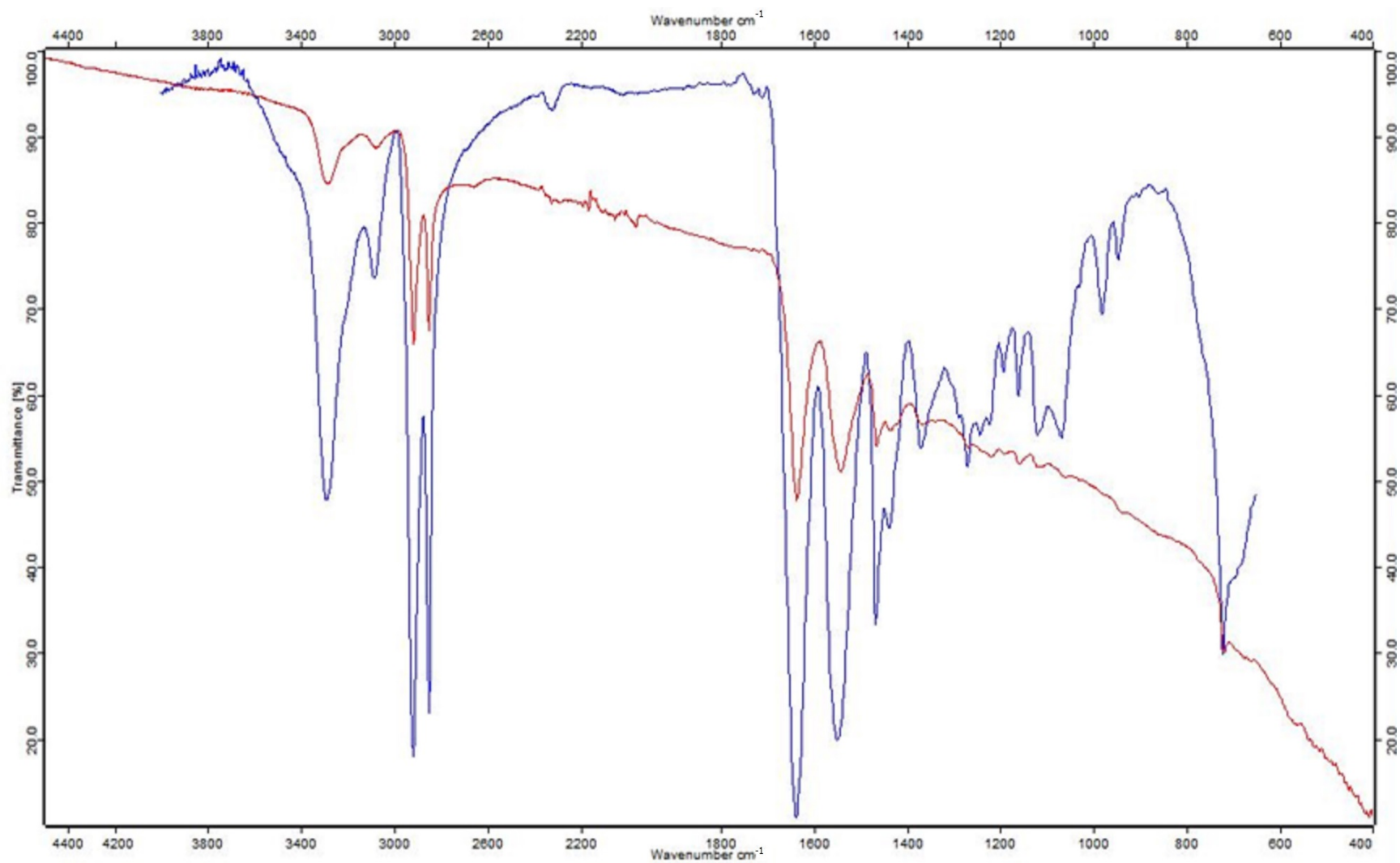


Figure S1. FTIR spectrum of magnet sample #1 in Table 1 (red) and polyamide 12 pattern from the database (blue).

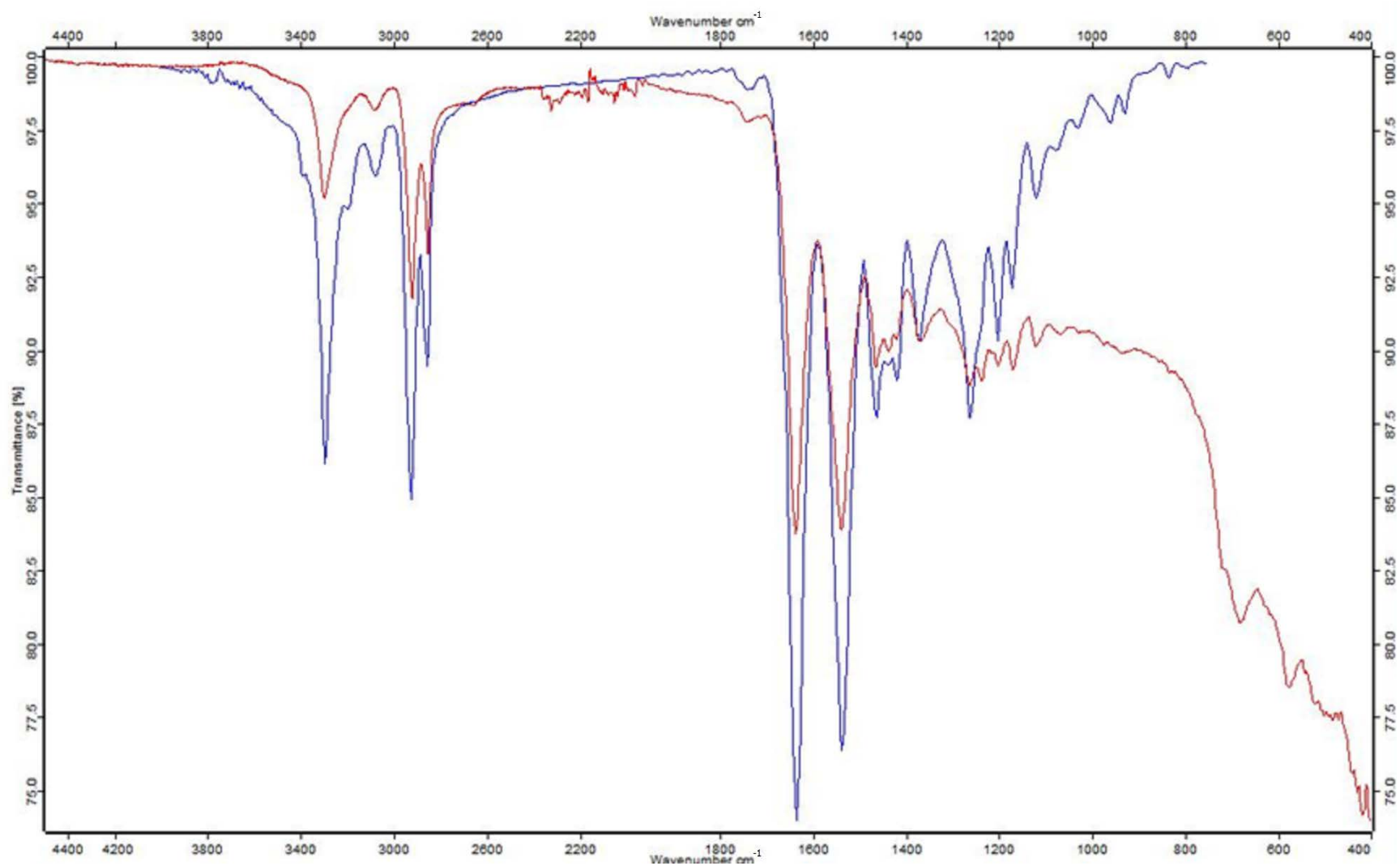


Figure S2. FTIR spectrum of magnet sample #3 in Table 1 (red) and polyamide 6 blended with trilene XL pattern from the database (blue).

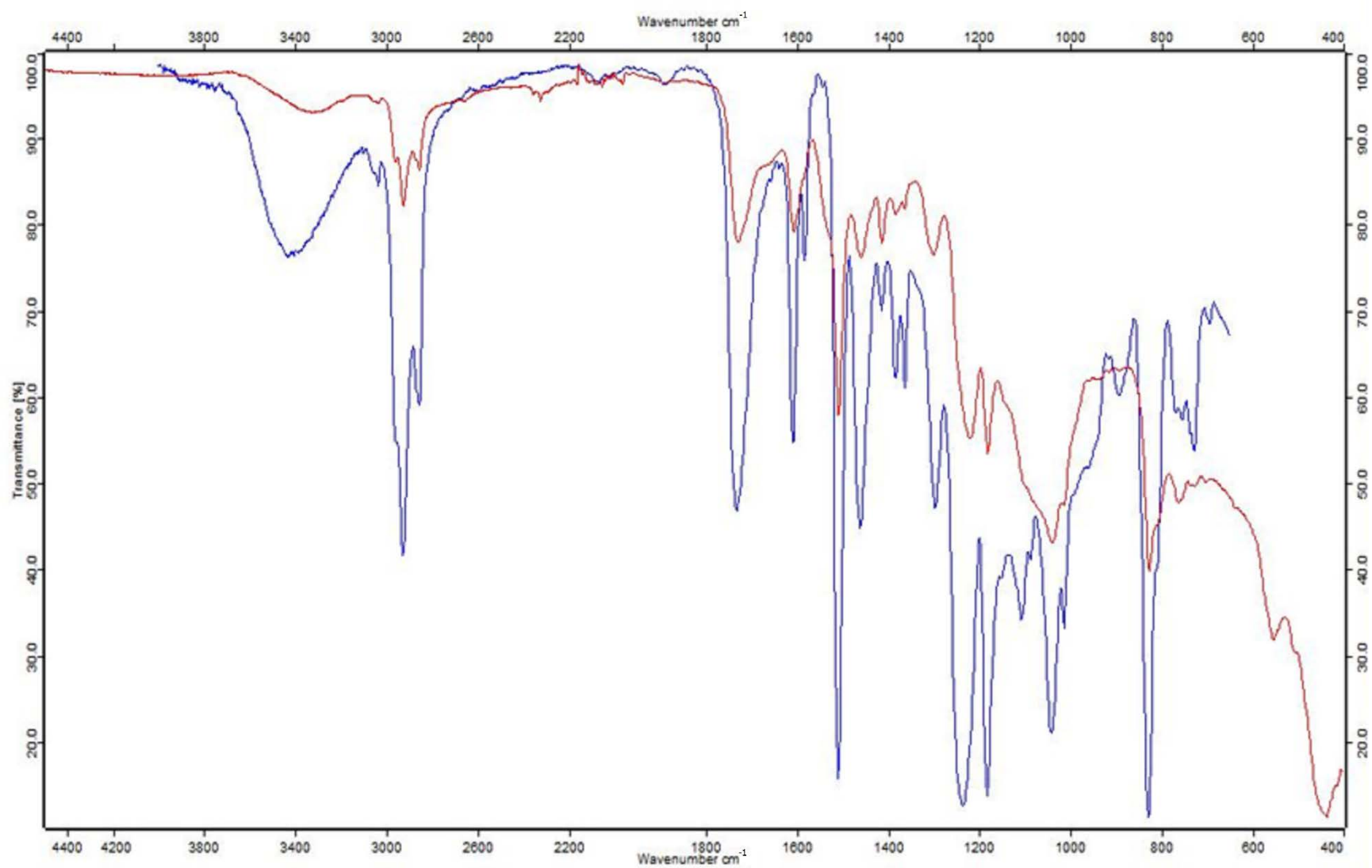


Figure S3. FTIR spectrum of magnet sample #6 in Table 1 (red) and epoxy pattern from the database (blue).

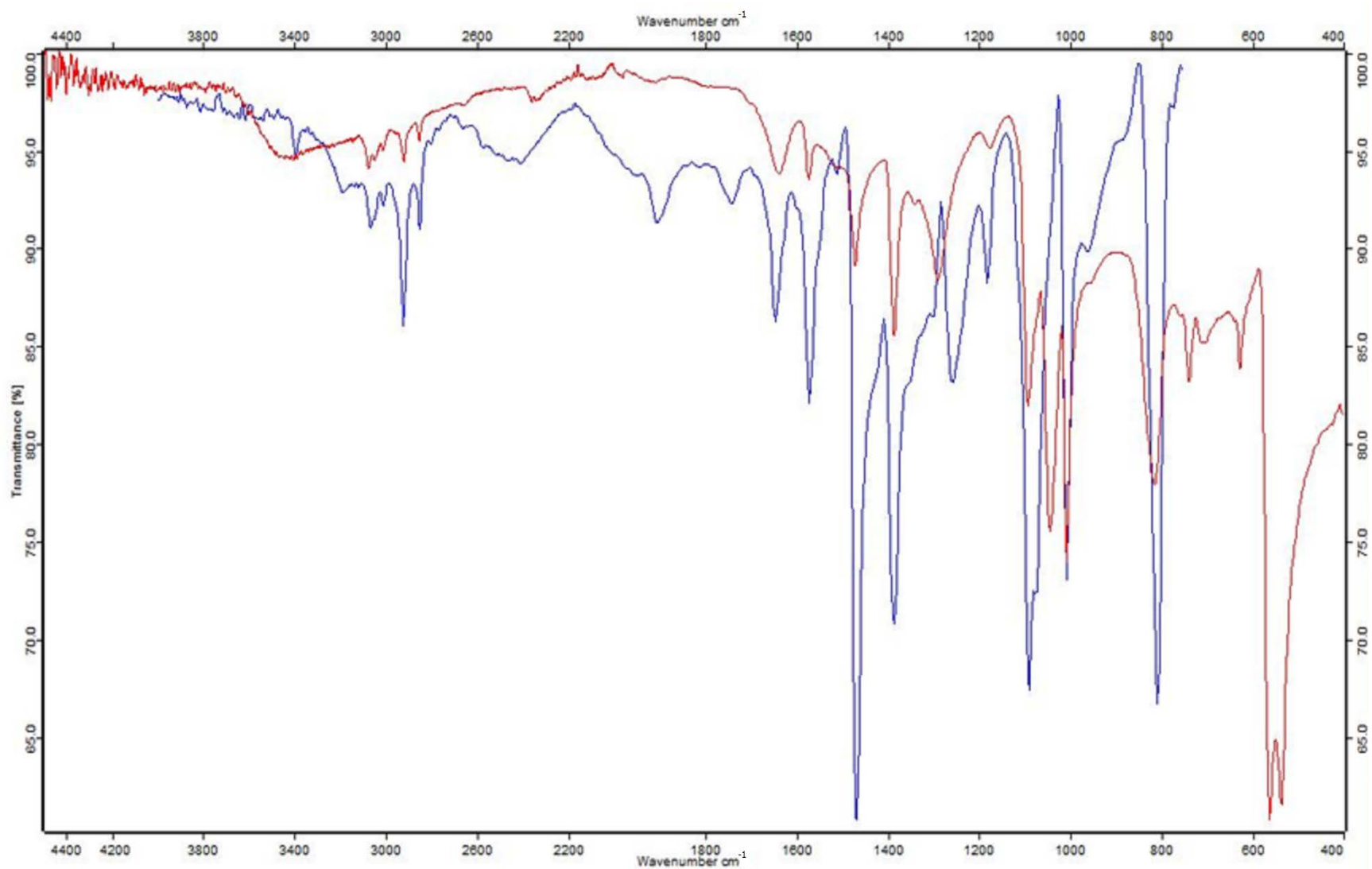


Figure S4. FTIR spectrum of magnet sample #9 in Table 1 (red) and poly-p-phenylene sulfide pattern from the database (blue).

## Thermogravimetric analysis results for bonded NdFeB magnets

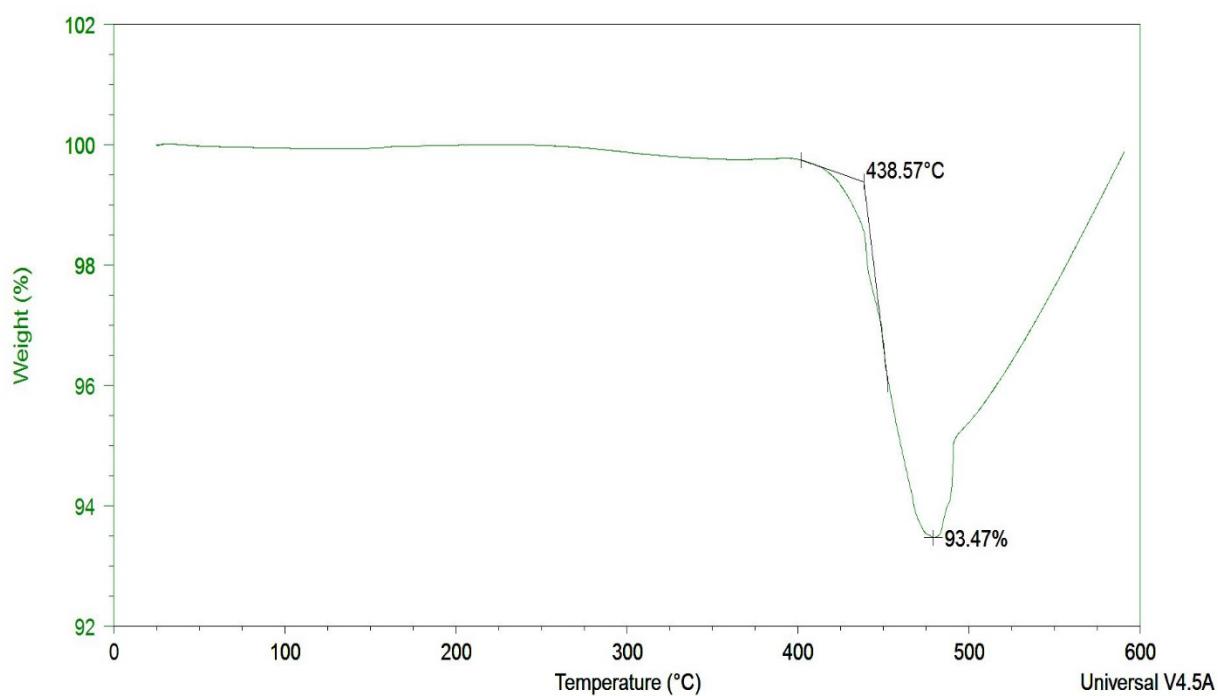


Figure S5. Thermogravimetric curve of magnet sample #1 (polyamide 12) in Table 1.

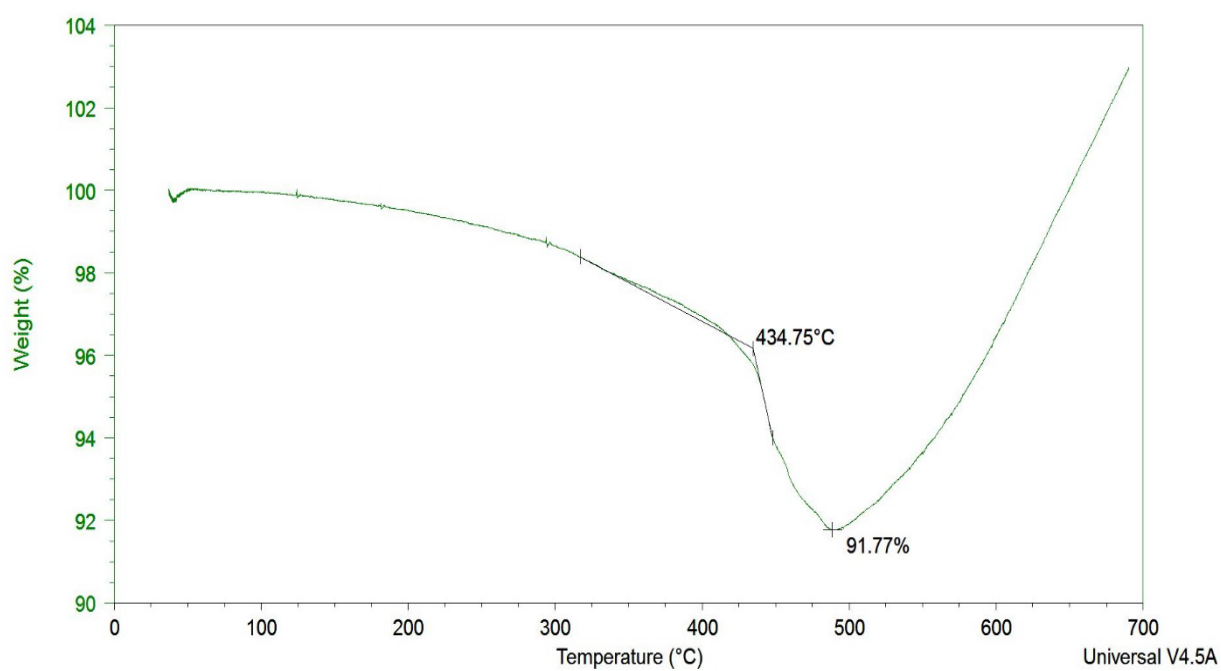


Figure S6. Thermogravimetric curve of magnet sample #3 (polyamide 6 blended with Trilene XL) in Table 1.

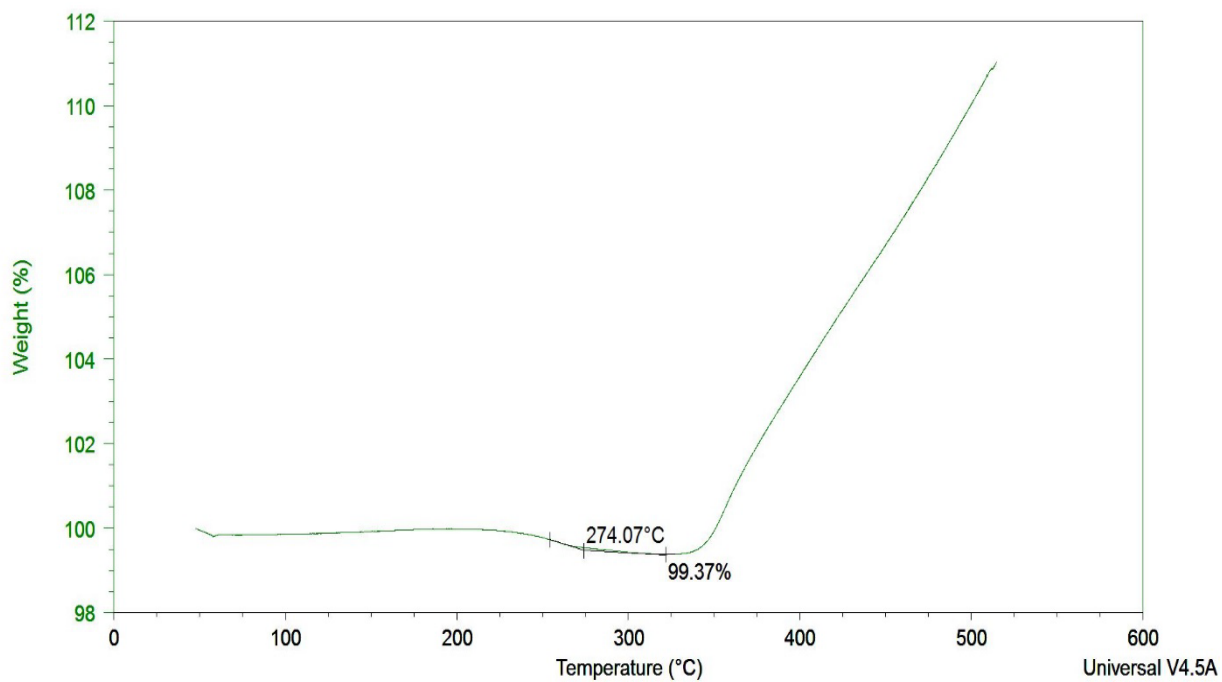


Figure S7. Thermogravimetric curve of magnet sample #6 (epoxy) in Table 1.

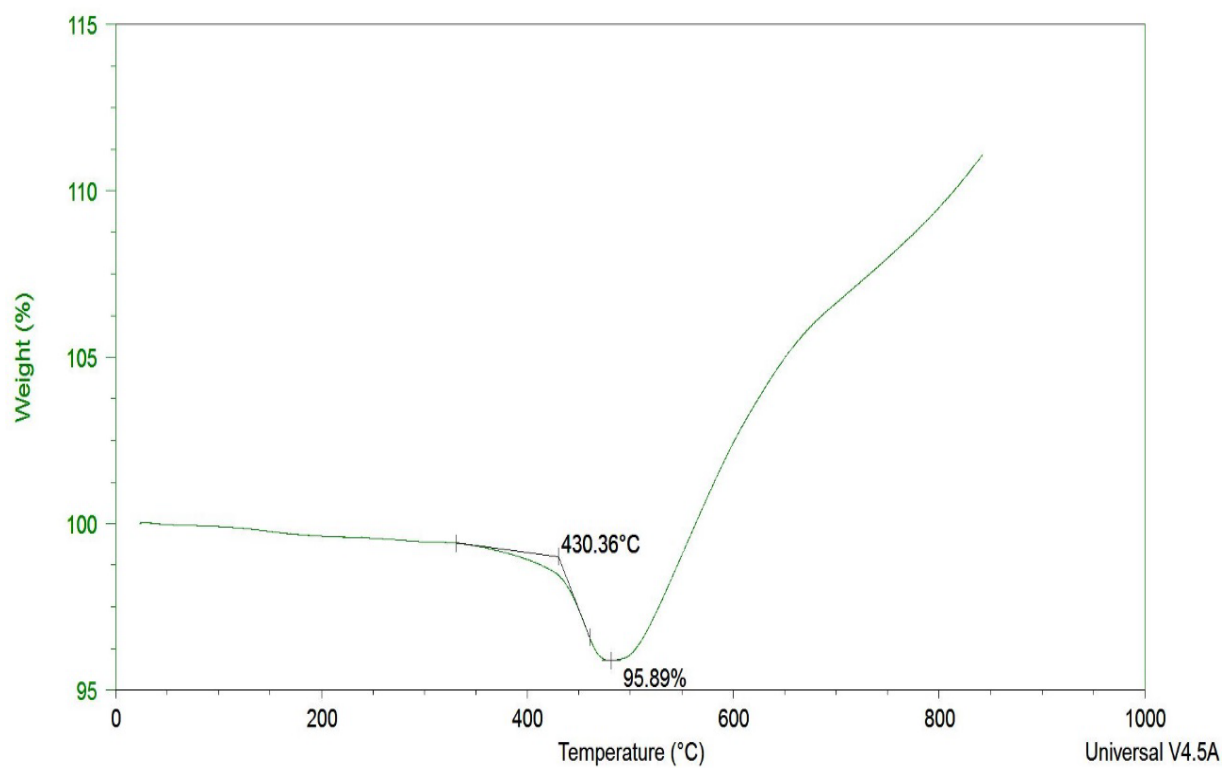


Figure S8. Thermogravimetric curve of magnet sample #9 (PPS) in Table 1.

### **$^1\text{H}$ NMR analysis result of recovered $[\text{P}_{4442}][\text{Et}_2\text{PO}_4]$ solvent**

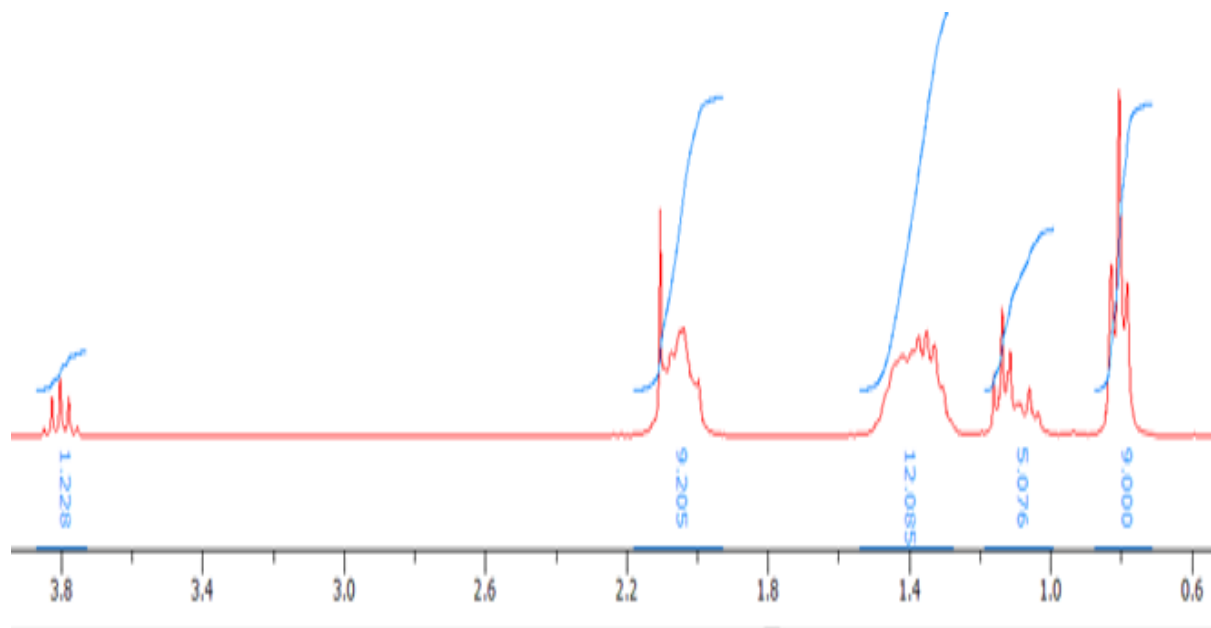


Figure S9.  $^1\text{H}$  NMR of recovered  $[\text{P}_{4442}][\text{Et}_2\text{PO}_4]$  after interaction with an epoxy-bonded magnet. There are not many phosphate anions present as there are phosphonium cations.

### **Pictures from dissolution experiments of bonded NdFeB magnets**



Figure S10. Magnet powder obtained after refluxing an epoxy-bonded magnet in an aqueous NaOH solution. The powder shows clear signs of oxidation.





Figure S11. White precipitate of metal sulfates after dissolving PA12 from a PA12-bonded magnet by concentrated sulfuric acid.

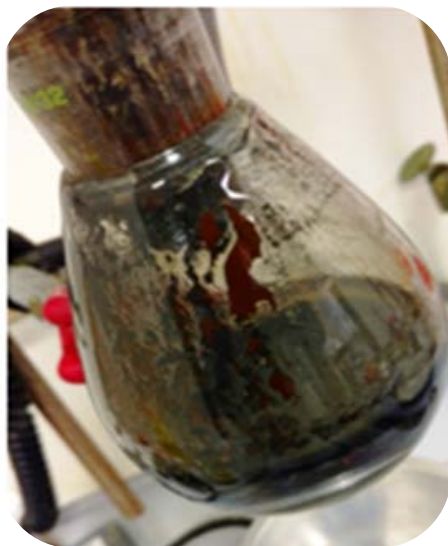


Figure S12. Left: Resulting mixture after stirring bonded magnets in a hydrogen peroxide solution at 60 °C for several days. The bonded magnets fell apart and show signs of oxidation. Right: Recovery of polymers after dissolving the magnet powder in acid.