

Removal of Copper Corrosion Products by Using Green Deep Eutectic Solvent and Bio-Derivative Cellulose Membrane

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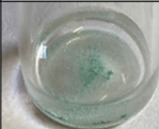
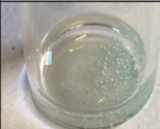
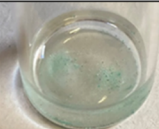
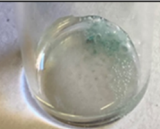
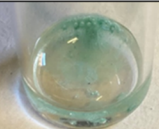
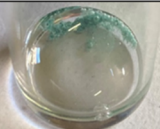
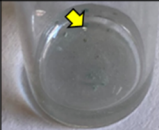

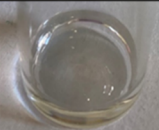


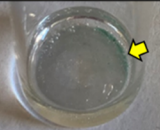












| | DES10 | DES30 | DES50 | DES70 | DES80 | DES90 |
|-------------------|---|---|---|--|---|---|
| Soon after mixing |  |  |  |  |  |  |
| After 1h |  |  |  |  |  |  |
| After 1day |  |  | No change | No change |  |  |
| After 4 days | No change | No change |  | No change | No change |  |
| After 1 week |  |  |  |  |  |  |

Figure S1. Photos taken during the course of dissolution test of patina powders. DES10: Formation of blue precipitation after partial dissolution of patina. DES30: Formation of blue precipitation after complete dissolution. DES50: Formation of greenish blue precipitation after complete dissolution, which was then turned into brown. DES70: Color change after complete dissolution but no formation of precipitation. DES80 & 90: Slow but complete dissolution. No change in the solution color after 1 week.

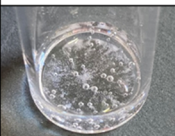
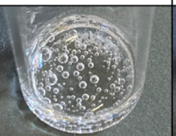
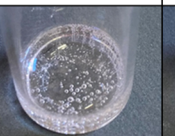
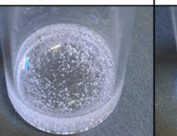
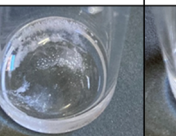

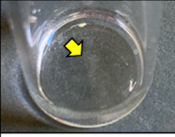
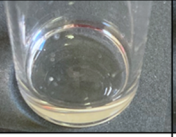
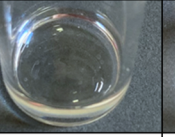
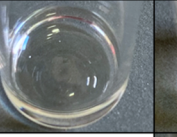
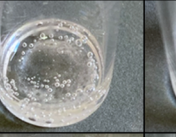

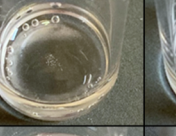

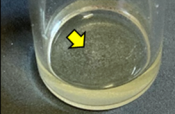
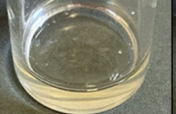

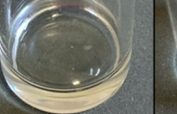
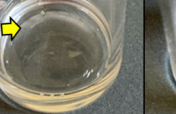
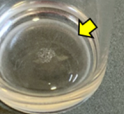
| | DES10 | DES30 | DES50 | DES70 | DES80 | DES90 |
|-------------------|---|---|---|--|---|---|
| Soon after mixing |  |  |  |  |  |  |
| After 1h |  |  |  |  |  |  |
| After 1day | No change | No change | No change | No change |  |  |
| After 1 week |  |  |  |  |  |  |

Figure S2. Photos taken during the course of dissolution test of calcium carbonate. DES10: Trace amount of CaCO_3 remained in the bottom of vial. DES30, 50 & 70: Fast and complete dissolution. DES80 & 90: Incomplete dissolution even after 1 week.

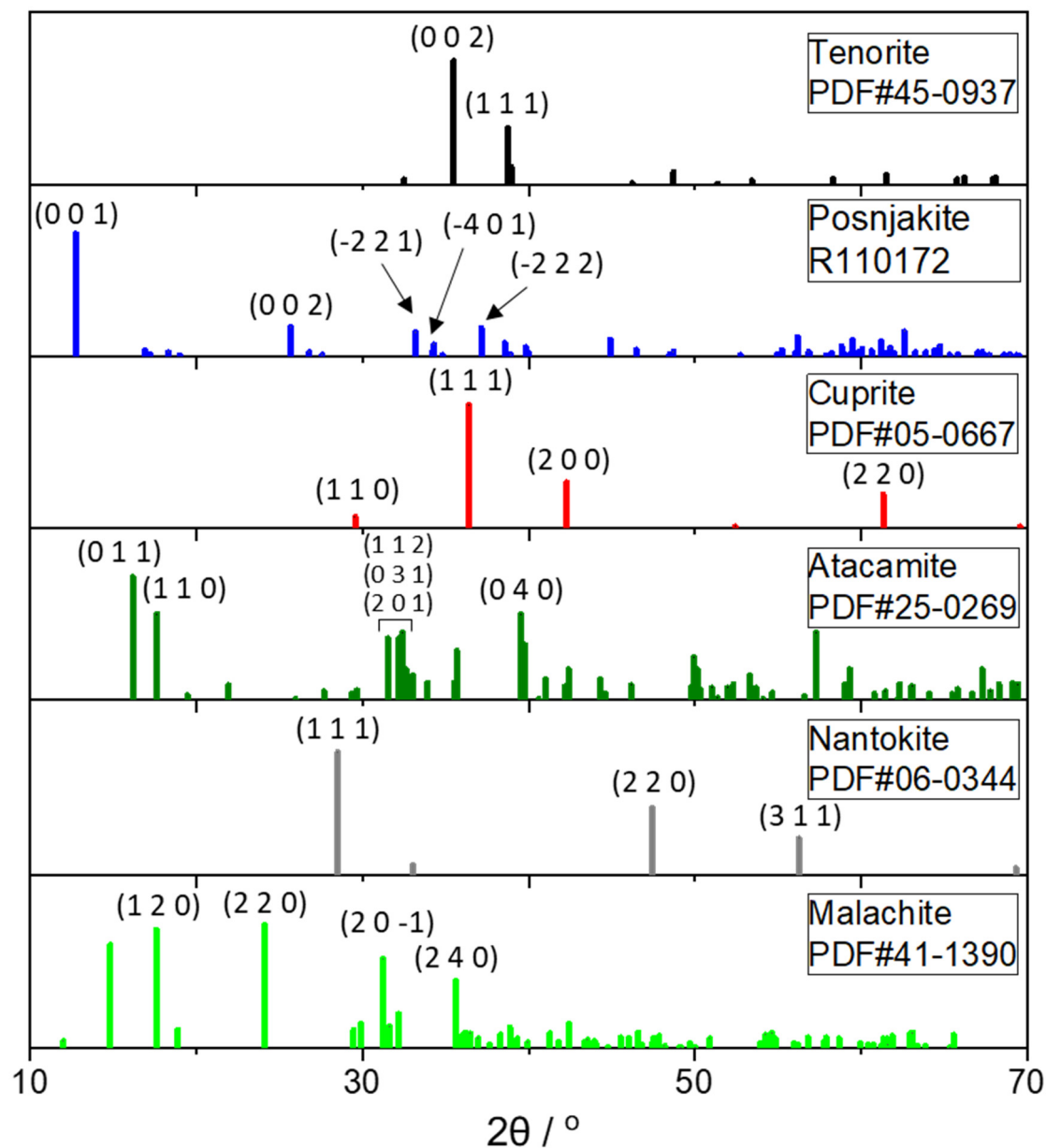


Figure S3. Reference spectra used for the assignment of Figure 4 (tenorite PDF#45-0937, cuprite PDF#05-0667, atacamite PDF#25-0269, nantokite PDF#06-0344, and malachite PDF#41-1390 taken from the International Centre for Diffraction Data (ICDD), as well as posnjakite R110172 taken from the RRUFF database).