Supplementary Material

One-Step Synthesis of Iron and Titanium-Based Compounds Using Black Mineral Sands and Oxalic Acid under Subcritical Water Conditions

Carla S. Valdivieso-Ramírez [1], Patricia I. Pontón [1], Anja Dosen [2], Bojan A. Marinkovic [2,*] and Victor H. Guerrero [1,*]

[1] Department of Materials, Escuela Politécnica Nacional, Quito 170525, Ecuador; carla.valdivieso@epn.edu.ec (C.S.V.-R.); patricia.ponton@epn.edu.ec (P.I.P.)
[2] Department of Chemical and Materials Engineering, Pontifical Catholic University of Rio de Janeiro (PUC-Rio), Rio de Janeiro 38097, Brazil; adosen@puc-rio.br
* Correspondence: bojan@puc-rio.br (B.A.M.); victor.guerrero@epn.edu.ec (V.H.G.)

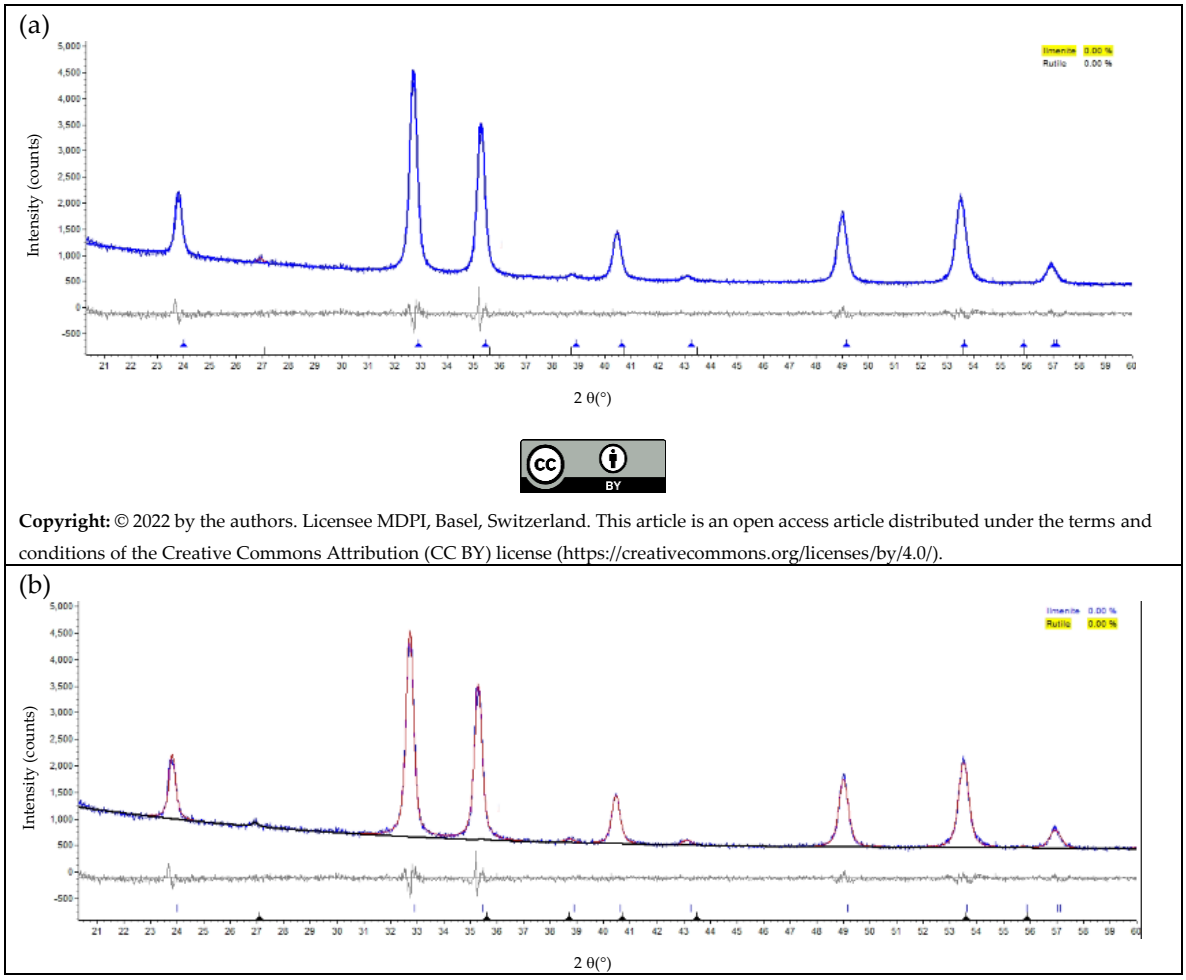

Figure S1. Le Bail fitting of SCW sample: (**a**) the main phase is an ilmenite-hematite solid solution, and (**b**) the secondary phase is rutile.

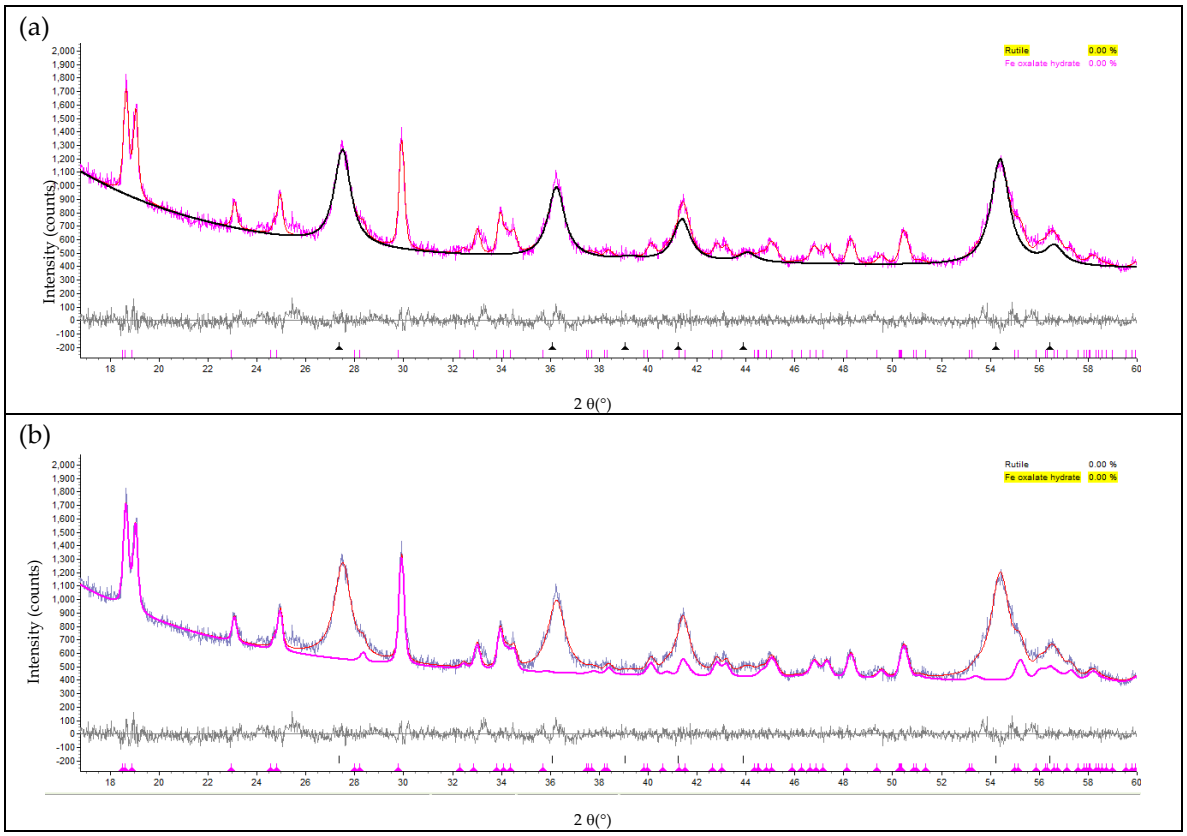

Figure S2. Le Bail fitting of WA fraction for 0.1 M, demonstrating the presence of (**a**) rutile and (**b**) Fe oxalate hydrate (PDF 23-0293, a = 9.84 Å).

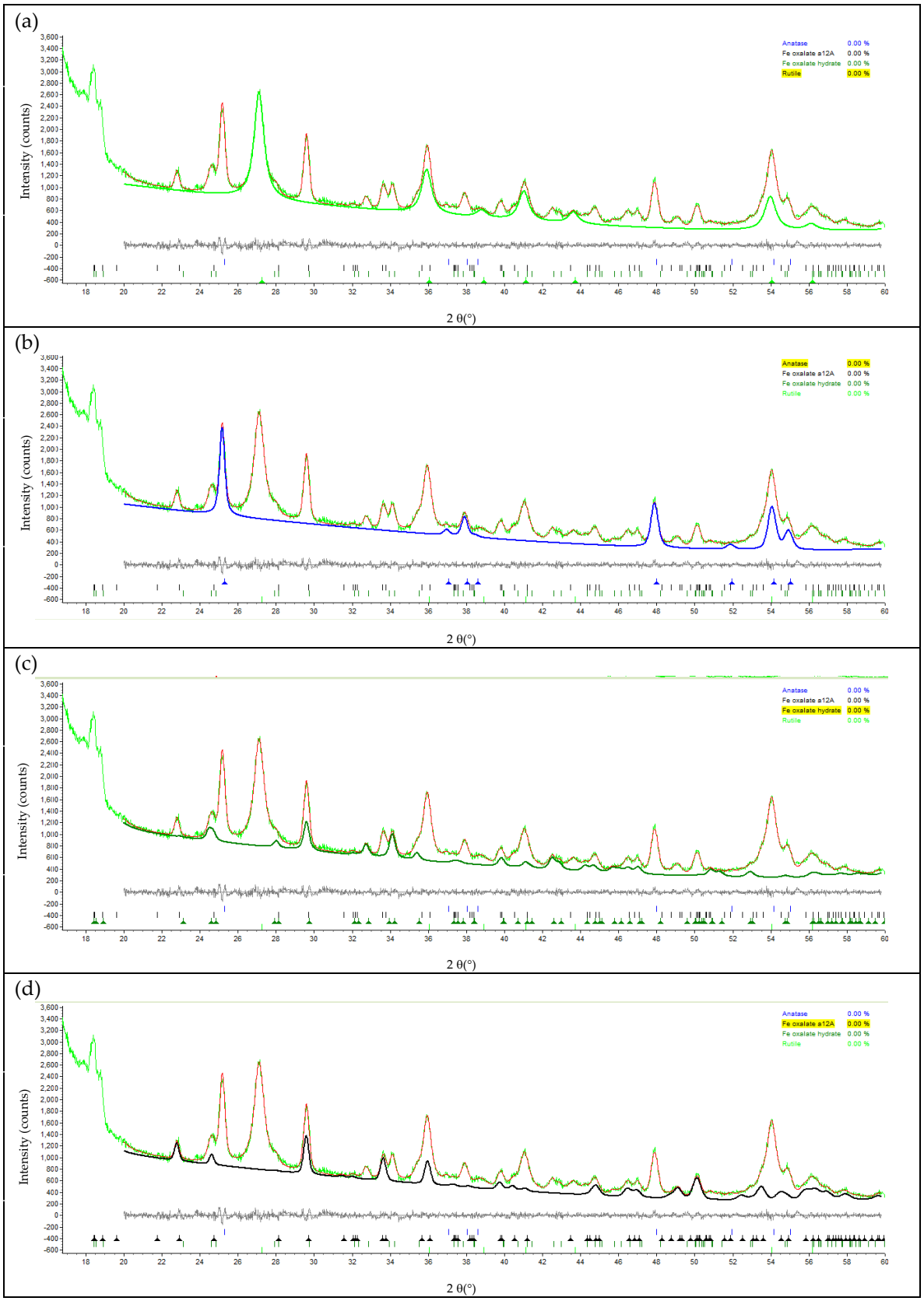

Figure S3. Le Bail fitting of WA fraction for 0.5 M, showing the presence of (**a**) rutile, (**b**) anatase, (**c**) ferrous oxalate hydrate (PDF 23-0293, a=9.84 Å), and (**d**) ferrous oxalate hydrate (PDF 72-1305, a = 12.06 Å).

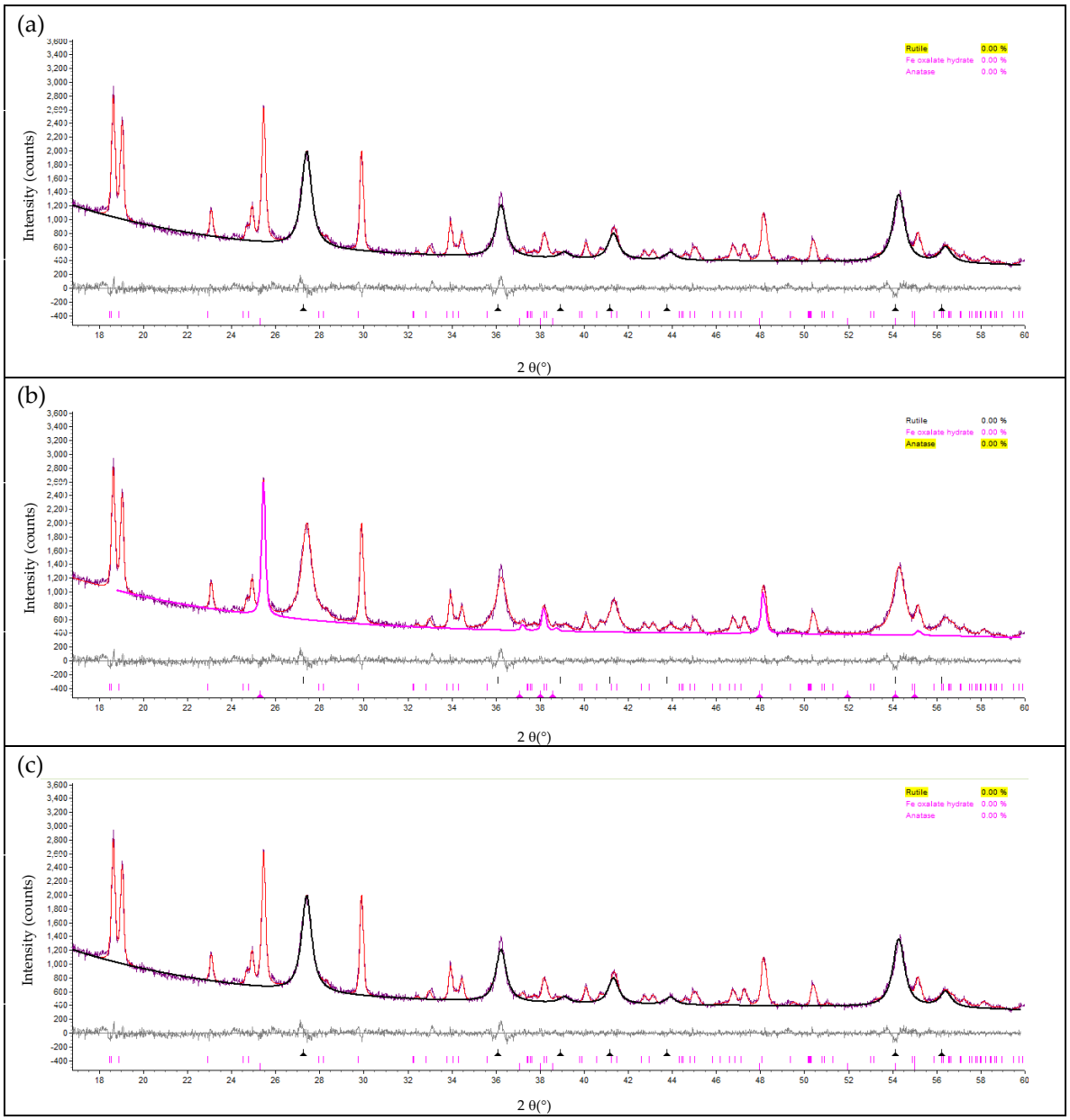

Figure S4. Le Bail fitting of WA fraction for 1.0 M, showing the presence of (**a**) rutile, (**b**) anatase and (**c**) ferrous oxalate hydrate (PDF 23-0293, a = 9.84 Å).

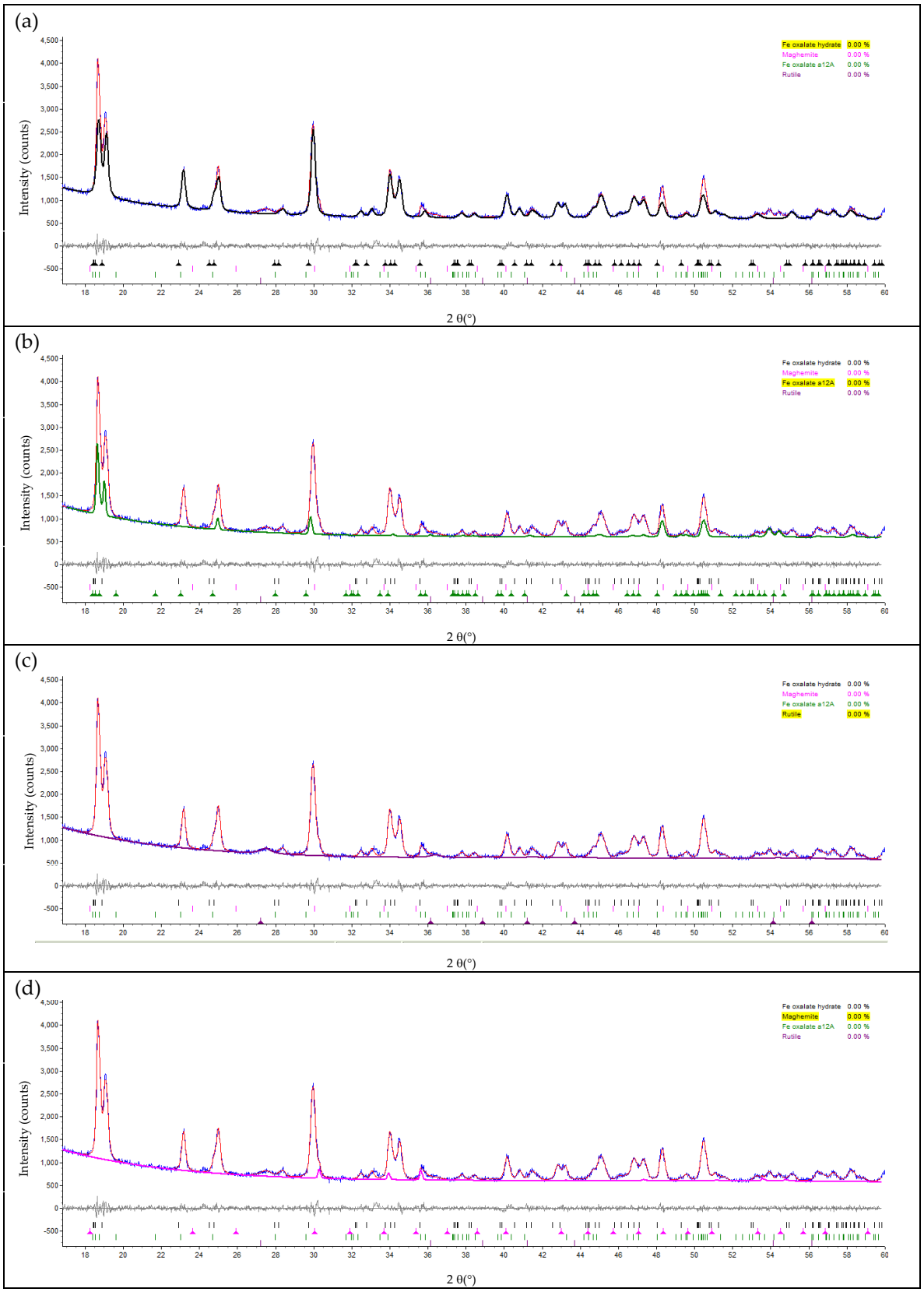

Figure S5. Le Bail fitting of WB fraction for 0.1 M, showing the presence of main phases: (**a**) ferrous oxalate hydrate (PDF 23-0293, a = 9.84 Å), (**b**) ferrous oxalate hydrate (PDF 72-1305, a=12.06 Å), and secondary phases: (**c**) rutile and (**d**) maghemite.

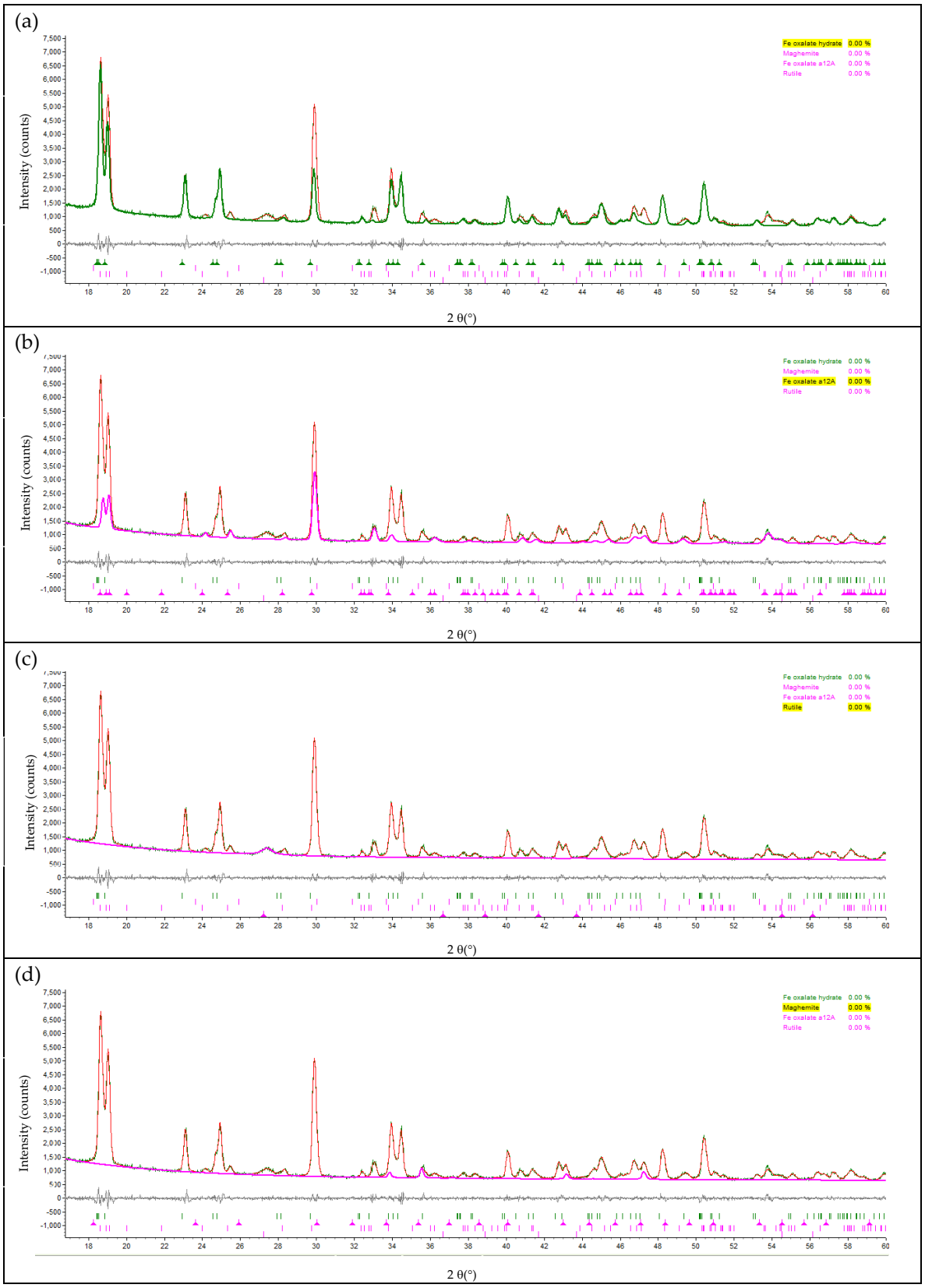

Figure S6. Le Bail fitting of WB fraction for 0.5 M, showing the presence of main phases: (**a**) ferrous oxalate hydrate (PDF 23-0293, a = 9.84 Å), (**b**) ferrous oxalate hydrate (PDF 72-1305, a = 12.06 Å), and secondary phases: (**c**) rutile and (**d**) maghemite.

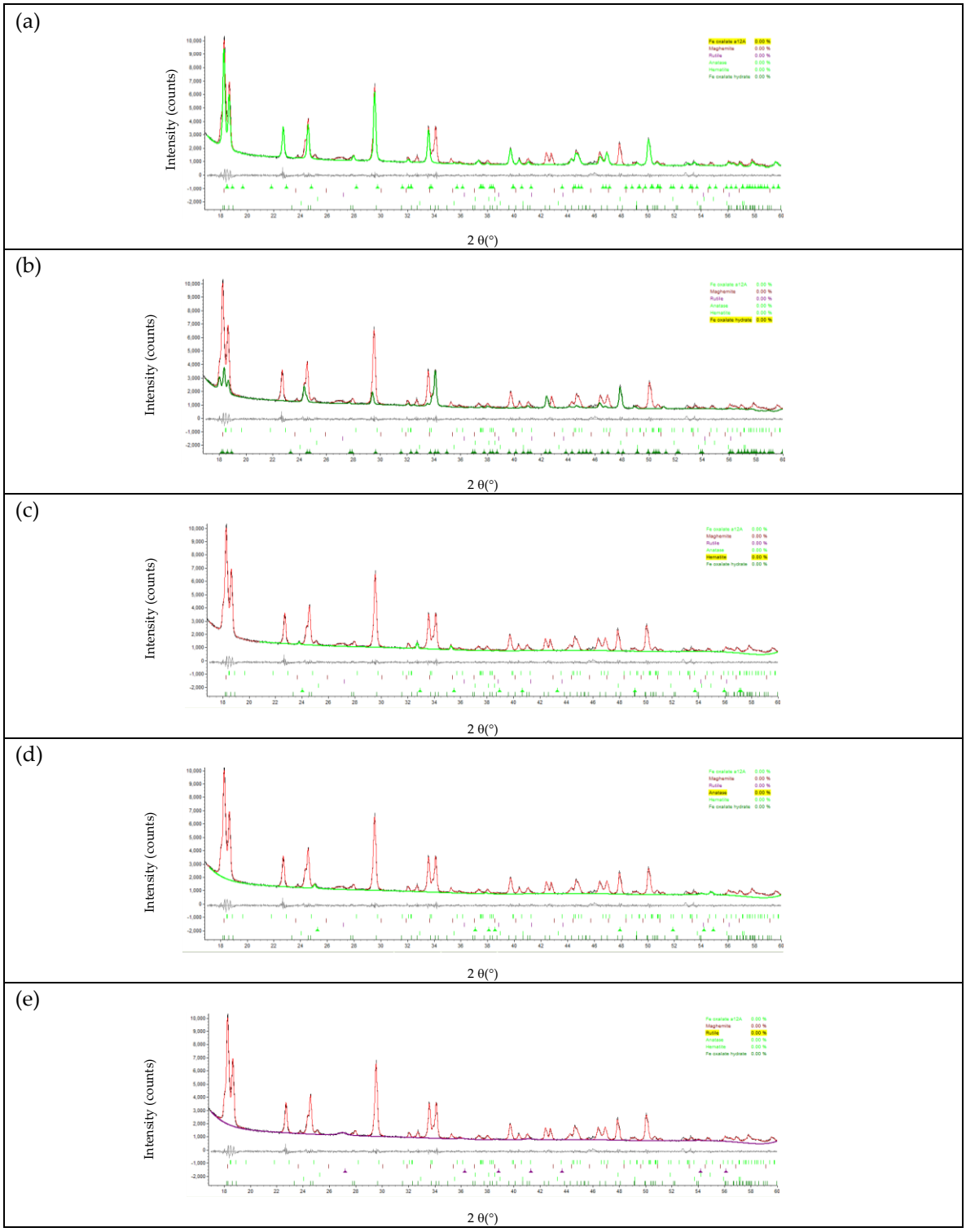

Figure S7. Le Bail fitting of WB fraction for 1.0 M, showing the presence of main phases: (**a**) ferrous oxalate hydrate (PDF 72-1305, a = 12.06 Å), (**b**) ferrous oxalate hydrate (PDF 23-0293, a = 9.84 Å), and secondary phases: (**c**) hematite, (**d**) anatase and (**e**) maghnemite.

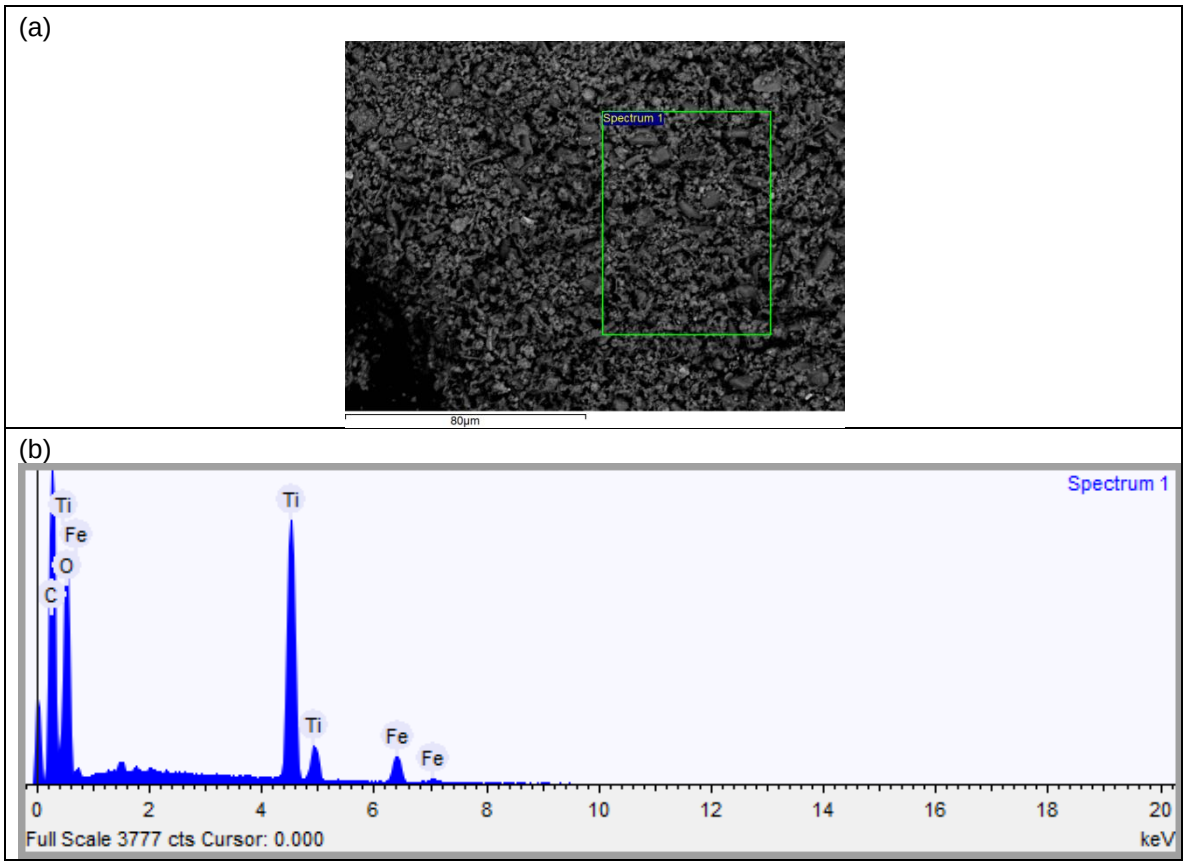

Figure S8. (**a**) EDS mapping and (**b**) EDS spectrum of WA fraction for 1.0 M.

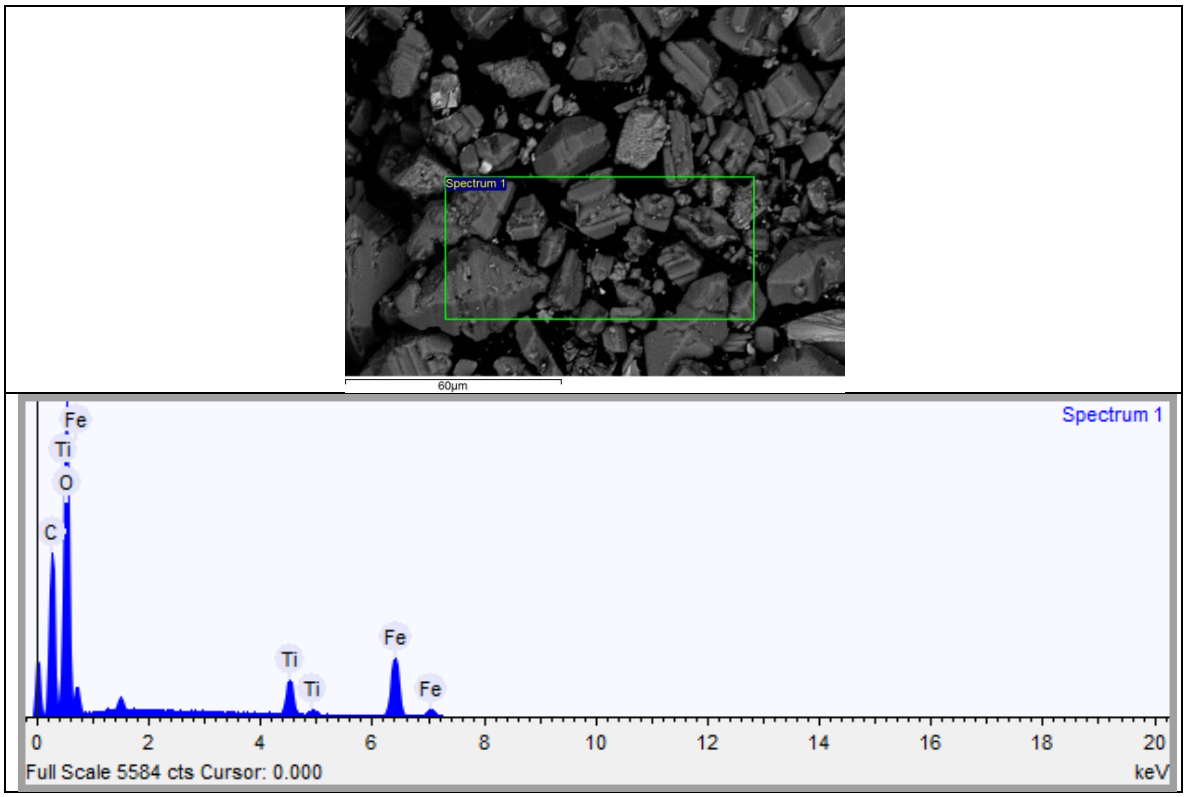

Figure S9. (a) EDS mapping and (b) EDS spectrum of WA fraction for 1.0 M.

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'1/2+y,1/4-z,3/4-x'
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