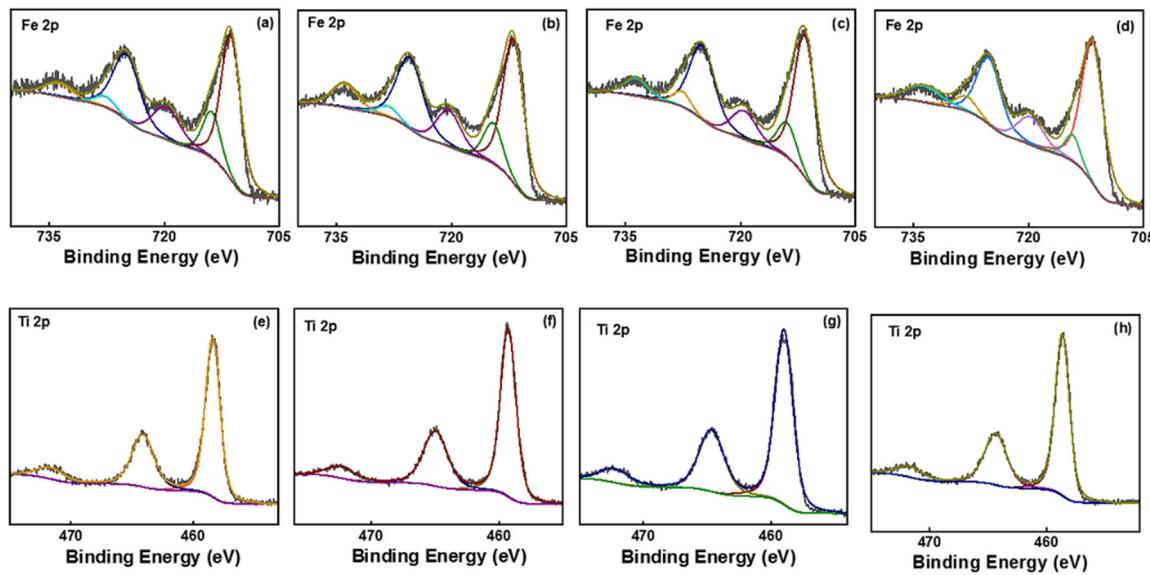


Figure S1. XRD pattern of (a) Ilmenite sand and (b) Amorphous TF.



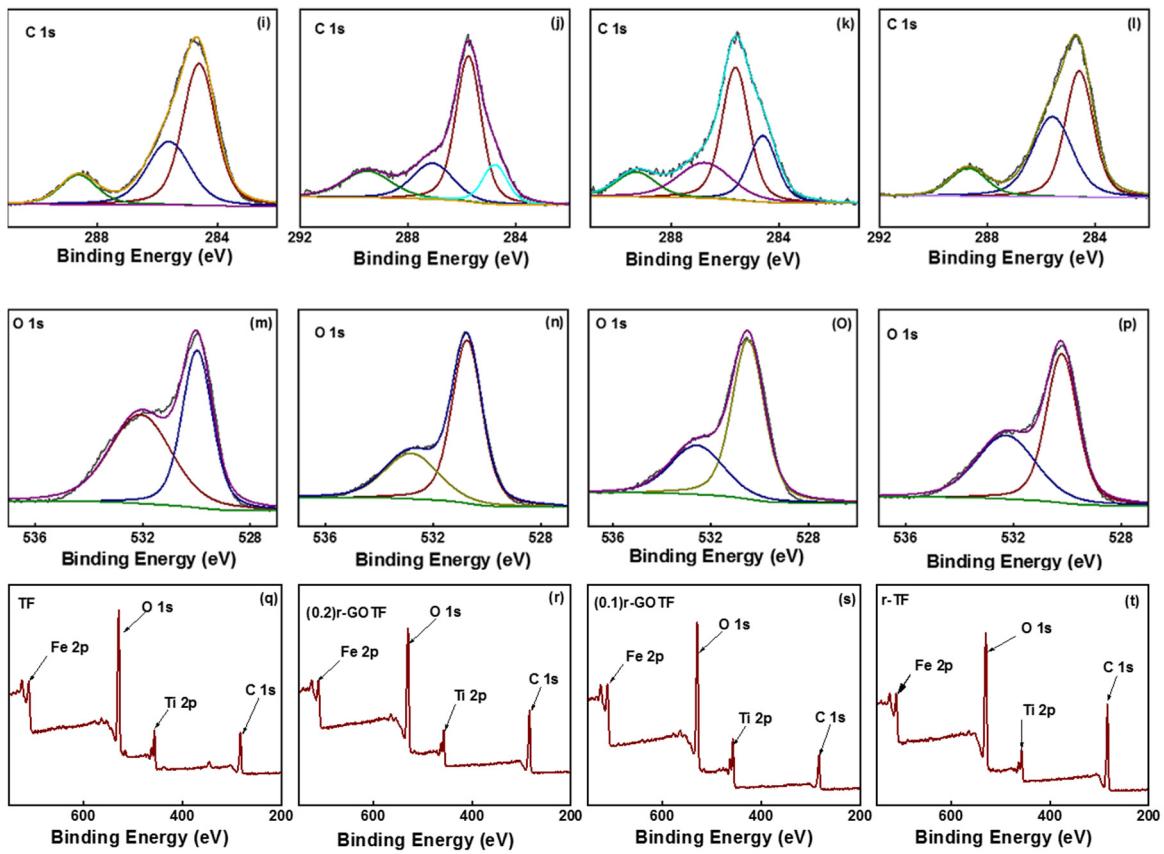


Figure S2. High-resolution XPS spectra of (a) Fe 2p of TF, (b) (0.2)r-GOTF, (c) (0.1)r-GOTF, (d) r-TF, Ti 2p of (e) TF, (f) (0.2)r-GOTF, (g) (0.1)r-GOTF, (h) Ti 2p of r-TF, (i) r-TF, (j) C 1s of TF, (k) C 1s of (0.2)r-GOTF, (l) C 1s of (0.1)r-GOTF, (m) C 1s of r-TF, (n) O 1s of TF, (o) O 1s of (0.2)r-GOTF, (p) O 1s of (0.1)r-GOTF. Survey spectra of (q) TF, (r) (0.2)r-GOTF, (s) (0.1)r-GOTF and (t) r-TF.

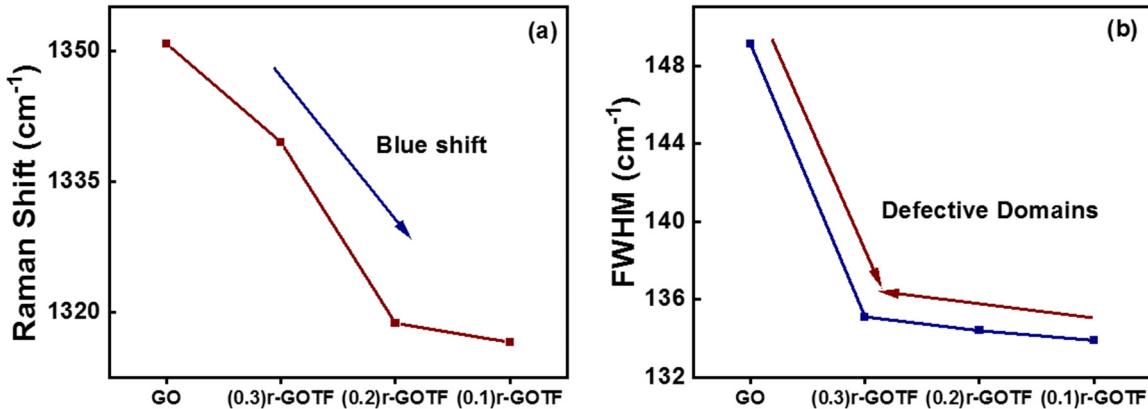


Figure S3. The variation of (a) D-band position, (b) FWHM of D-band in the Raman spectra of the composites.

Table S1. EDX elemental composition results of (a) TF and (b) (0.3)r-GOTF.

| (a) | | | | | | | | |
|---------|----------|----------|----------|---------|---------|--------|--------|--------|
| Element | Weight % | Atomic % | Net Int. | Error % | K ratio | Z | A | F |
| O K | 23.67 | 50.85 | 300.96 | 9.27 | 0.0850 | 1.1889 | 0.3020 | 1.0000 |
| AlK | 0.79 | 1.01 | 15.57 | 23.10 | 0.0035 | 1.0659 | 0.4123 | 1.0037 |
| SiK | 0.33 | 0.41 | 8.83 | 45.52 | 0.0020 | 1.0906 | 0.5399 | 1.0064 |
| TiK | 14.28 | 10.24 | 299.32 | 4.15 | 0.1486 | 0.9405 | 0.9852 | 1.1230 |
| MnK | 1.27 | 0.79 | 17.01 | 24.14 | 0.0121 | 0.9136 | 0.9806 | 1.0695 |

| FeK | 59.66 | 36.71 | 680.98 | 2.70 | 0.5496 | 0.9289 | 0.9882 | 1.0035 |
|------------|----------|----------|----------|---------|---------|--------|--------|--------|
| (b) | | | | | | | | |
| Element | Weight % | Atomic % | Net Int. | Error % | K ratio | Z | A | F |
| C K | 9.19 | 19.50 | 92.01 | 10.68 | 0.0312 | 1.1741 | 0.2892 | 1.0000 |
| O K | 33.12 | 52.75 | 582.38 | 9.05 | 0.1097 | 1.1279 | 0.2935 | 1.0000 |
| AlK | 0.90 | 0.85 | 27.88 | 16.85 | 0.0042 | 1.0095 | 0.4574 | 1.0036 |
| SiK | 0.32 | 0.29 | 13.16 | 33.48 | 0.0020 | 1.0325 | 0.5864 | 1.0063 |
| TiK | 11.05 | 5.88 | 331.85 | 4.28 | 0.1093 | 0.8885 | 0.9952 | 1.1188 |
| FeK | 45.42 | 20.73 | 745.29 | 2.74 | 0.3993 | 0.8764 | 0.9965 | 1.0063 |