-------- Supplementary information ---------

Development of multifunctional graphene/Fe-loaded polyester textile: robust electrical and catalytic properties

Mohammad Neaz Morshed[1, 2, 3, 4], Milad Asadi Miankafshe[5, 6, *], Nils Krister Persson[5,6], Nemeshwaree Behary[2,3], and Vincent A. Nierstrasz[1]

[1]Textile Materials Technology, Department of Textile Technology, The Swedish School of Textiles, Faculty of Textiles, Engineering and Business, University of Borås, SE-50190, Borås, Sweden
[2]Ecole Nationale Supérieure des Arts et Industries Textiles (ENSAIT), GEMTex Laboratory, 59056 Roubaix, France
[3]Université de Lille, Nord de France, F-59000 Lille, France
[4]College of Textile and Clothing Engineering, Soochow University, 215006 Suzhou, China
[5]The Swedish School of Textile, Polymeric E-textiles, University of Borås, SE-501 90 Borås, Sweden.
[6]Smart Textiles, University of Borås, SE-501 90 Borås, Sweden
**Corresponding author: Ph-+46763319111, E-mail: milad.asadi@hb.se (Milad Asadi Miankafshe)*

1. EXPERIMENTAL

1.1. Polyester nonwoven

Table S1: Physical characteristics of polyester nonwoven membranes

Physical characteristics	Values
Mass per unit area (g/m^2)	98.00
Thicknesses (mm)	0.94
Fibre density	0.80
Porosity (%)	99.91
Air permeability (mm/s)	854.20

2. RESULTS

2.1. Particle size distribution and digital images of polyester nonwoven fabrics

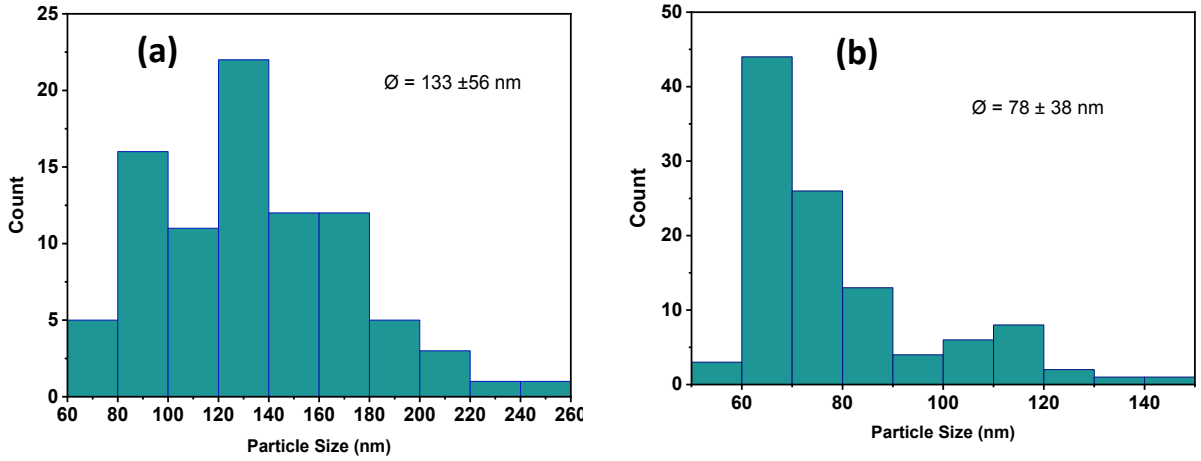


Fig. S1: Particle size distribution of zerovalent iron nanoparticles; (a) PET-rGO- Fe^0 and (b) PET-PAM-rGO- Fe^0

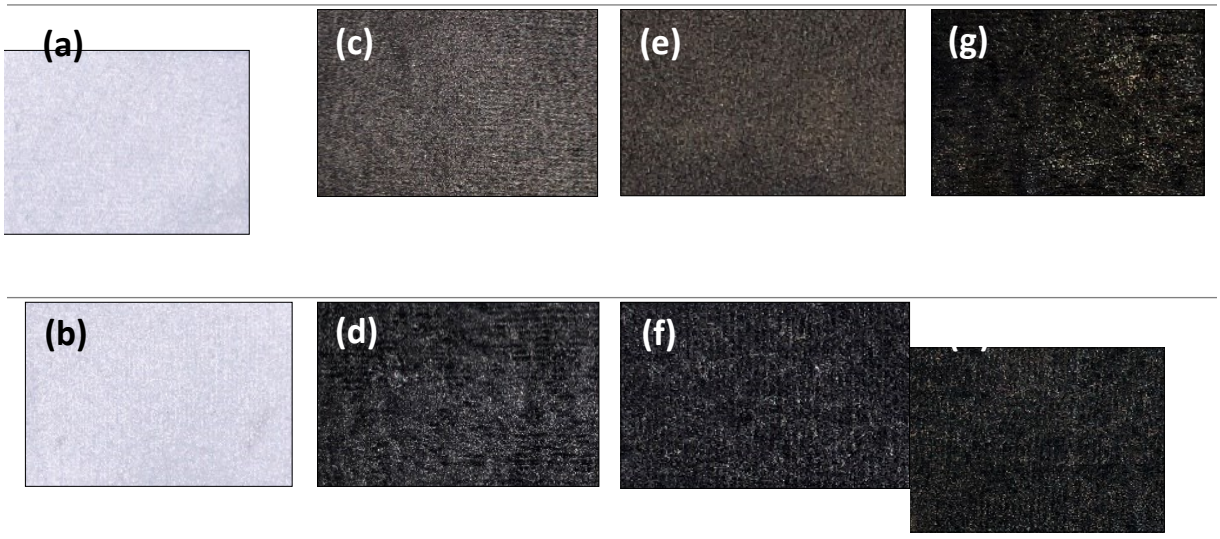


Fig. S2: Digital Images of the samples (a) PET, (b) PET-PAM, (c) PET-GO, (d) PET-rGO, (e) PET-PAM-GO, (f) PET-PAM-rGO, (g) PET-rGO-Fe^0 and (h) PET-PAM-rGO-Fe^0.

2.2. The color strength and the coating evenness measurement

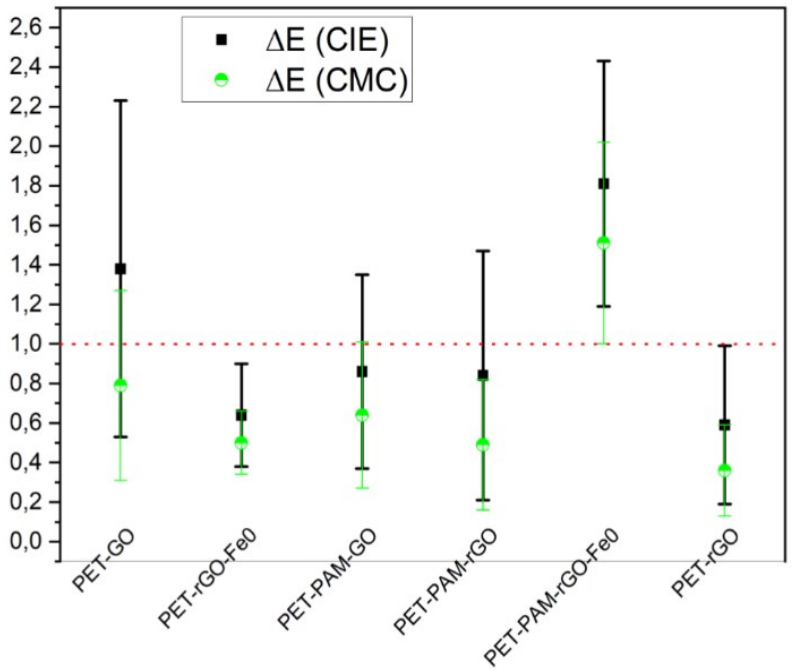
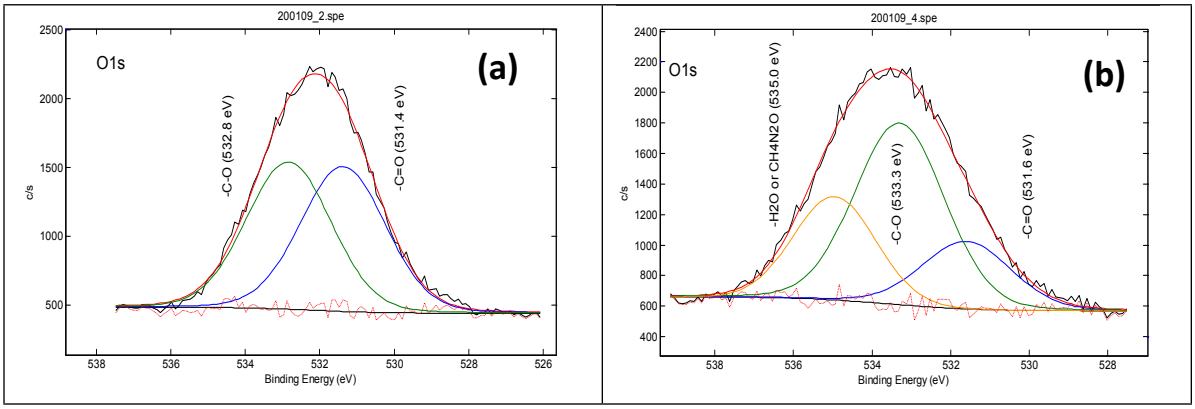


Fig. S3: The color differences (ΔE) of CIE and CMC systems (Values less than 1 are the smallest color differences than the human eye can detect)

2.3. X-ray photoelectron spectroscopy (XPS) analysis



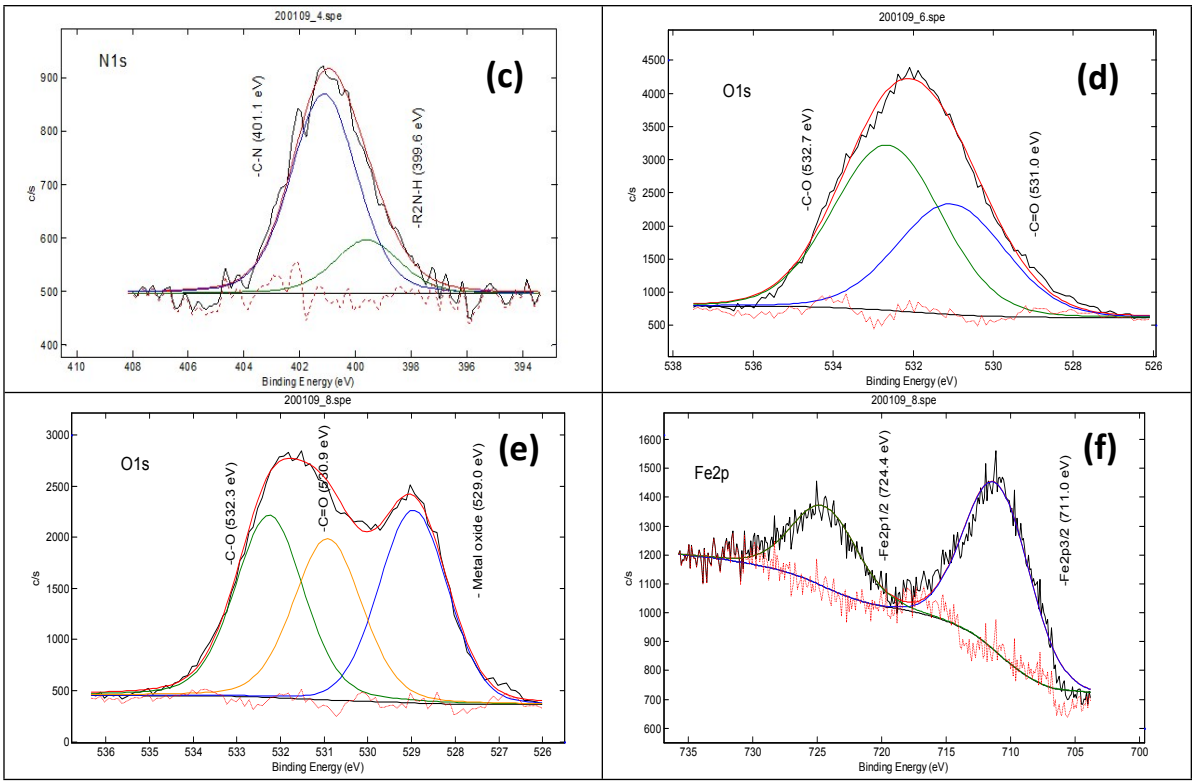


Fig. S4: O1s XPS analysis of (a) PET, (b) O1s XPS analysis of PET-PAM, (c) N1s XPS analysis of PET-PAM (d) O1s XPS analysis of PET-PAM-GO, (e) O1s XPS analysis of PET-PAM-rGO-Fe^0 and (f) Fe2p XPS analysis of PET-PAM-rGO-Fe^0

2.4. Thermogravimetric analysis (TGA)

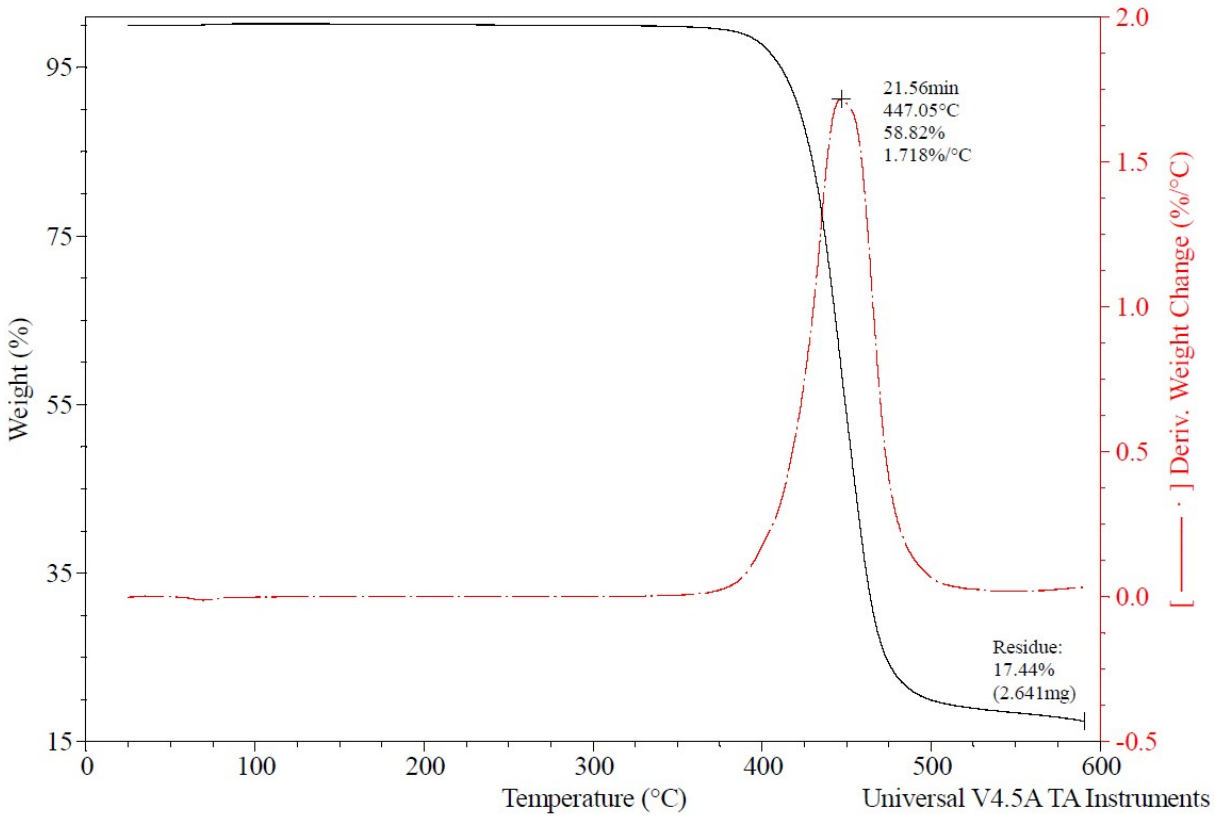


Fig. S5: TGA-DTG curve of untreated PET

Table S2: Summary of TGA and DTG data of samples in a nitrogen atmosphere.

Sample	**T_{onset} (°C)**	**T_{max} (°C)**	**Residue at T_{max} (%)**	**Residue at 600 °C (%)**
Pristine PET	410	452	51.08	16.6
PET	411	448	48.92	17.4
PET-GO	409	463	47.28	17.2
PET-rGO-Fe^0	343	447	67.43	47.6
PET-PAM	410	450	52.88	17.2
PET-PAM-GO	409	460	53.02	19.5
PET-PAM-rGO	411	455	54.42	21
PET-PAM-rGO- Fe^0	324	446	80.22	69.8
PET-rGO	412	454	54.29	21.25

2.5. Differential scanning calorimetry (DSC) analysis

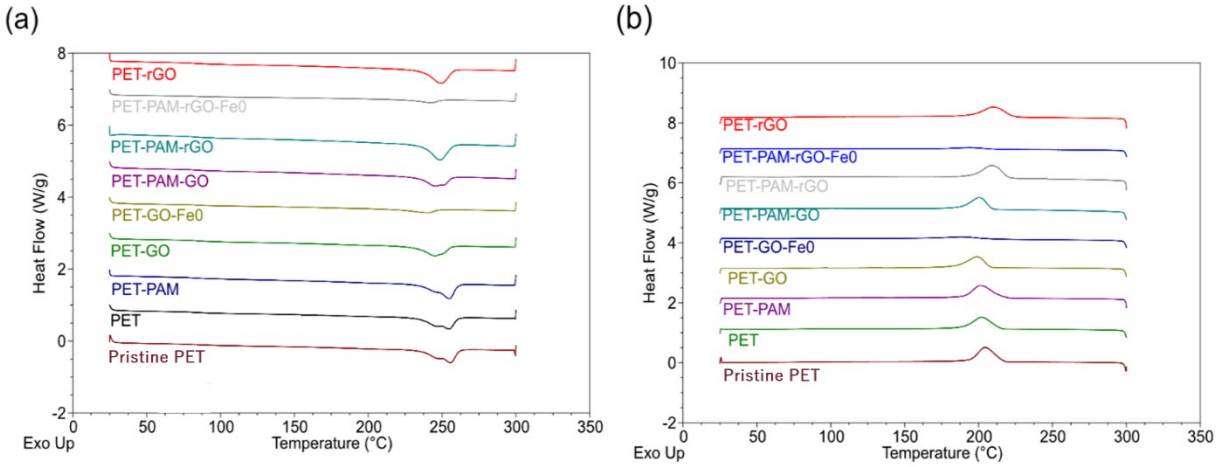


Fig. S6: DSC thermographs of samples, (a) second heating cycle and (b) cooling cycle.

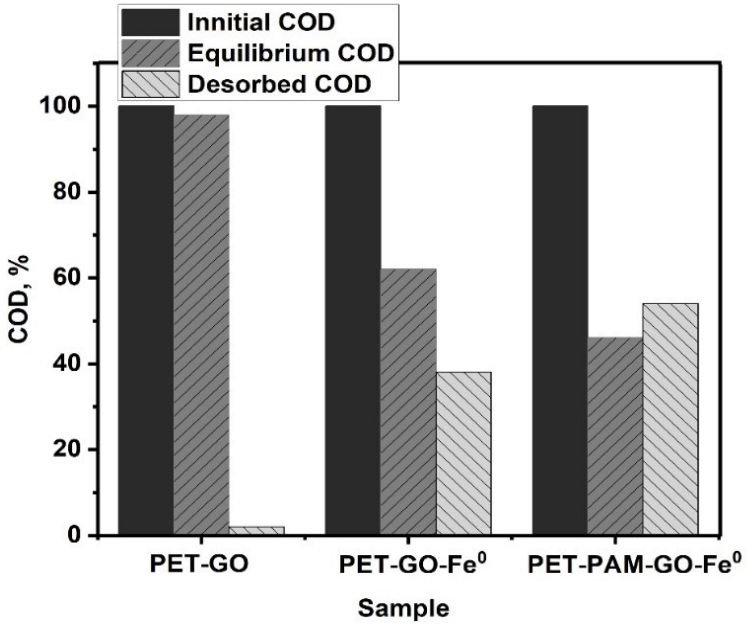


Fig. S7: Relative toxicity reduction analysis (a) untreated solution (control solution), (b) PET-rGO-Fe^0 treated solution and (c) PET-PAM-rGO-Fe^0 treated solution.