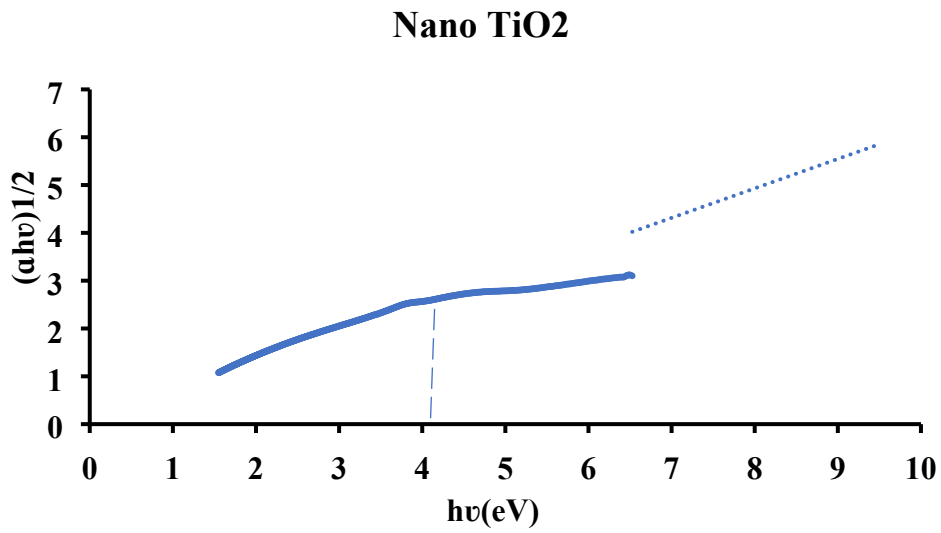
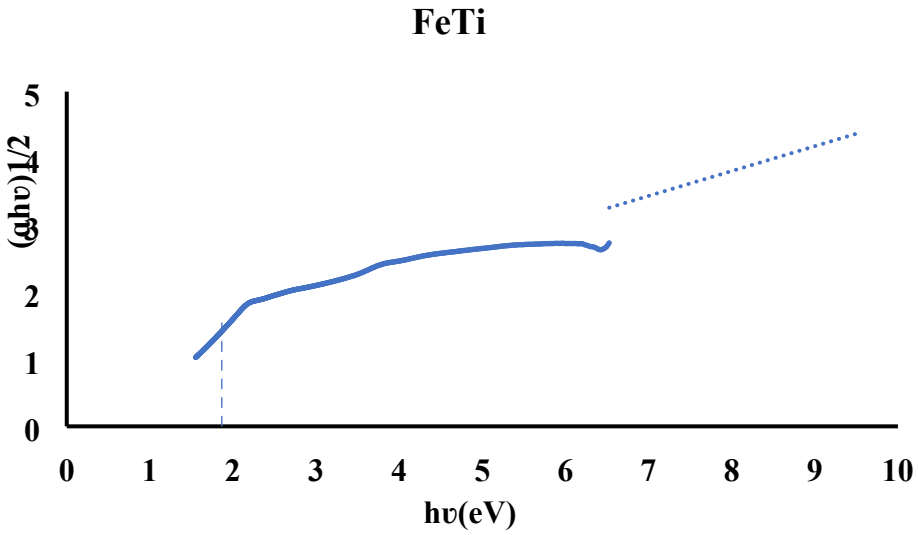
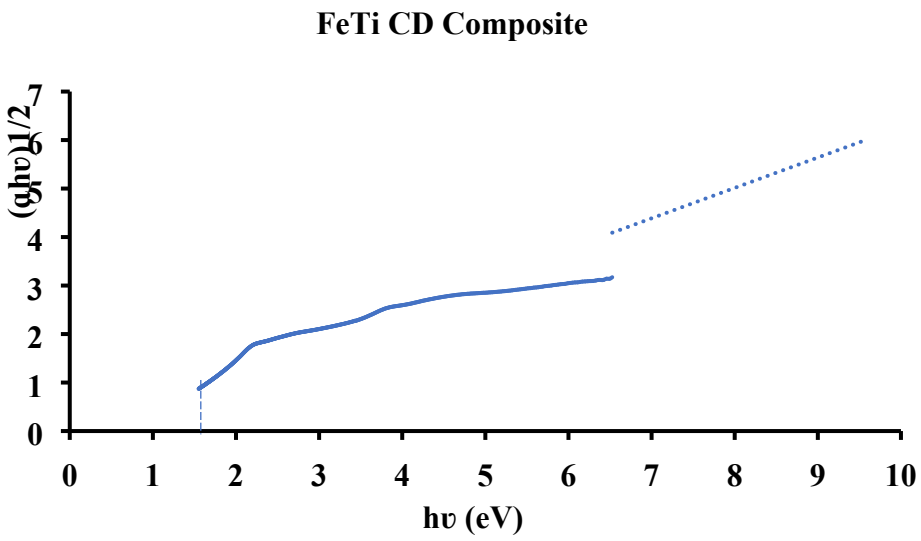
SUPPLEMENTARY INFORMATION



a)



b)



c)

Figure S1 Tauc plot of (a) Photocatalytic nano TiO_2 (b) Fe_2O_3-TiO_2 composite (c) Fe_2O_3-TiO_2-CD composite

The band gap of bulk anatase TiO_2 is around 3.2eV. It depends on crystal phase and particle size. For photocatalytic TiO_2 of size range about 5nm, quantum confinement effect can cause band gap to increase. But when composite is formed, it significantly lowered the band gap of pure TiO_2 which was observed as 4 eV from Figure S1(a) to 2 e.V for FeTi as in figure S1(b) and then to 1.7 eV for FeTiCD as given by Figure S1(c). Fe_2O_3 and CD in the composite must have formed a heterojunction with TiO2 which lowered band gap.

Tauc Relation

$(\alpha h\upsilon)^n = A(h\upsilon - Eg)$

α = Absorption Coefficient

h= Planck's constant

υ= Photon Energy

A= Constant

Eg=Optical bandgap

N=1/2 for direct allowed transition

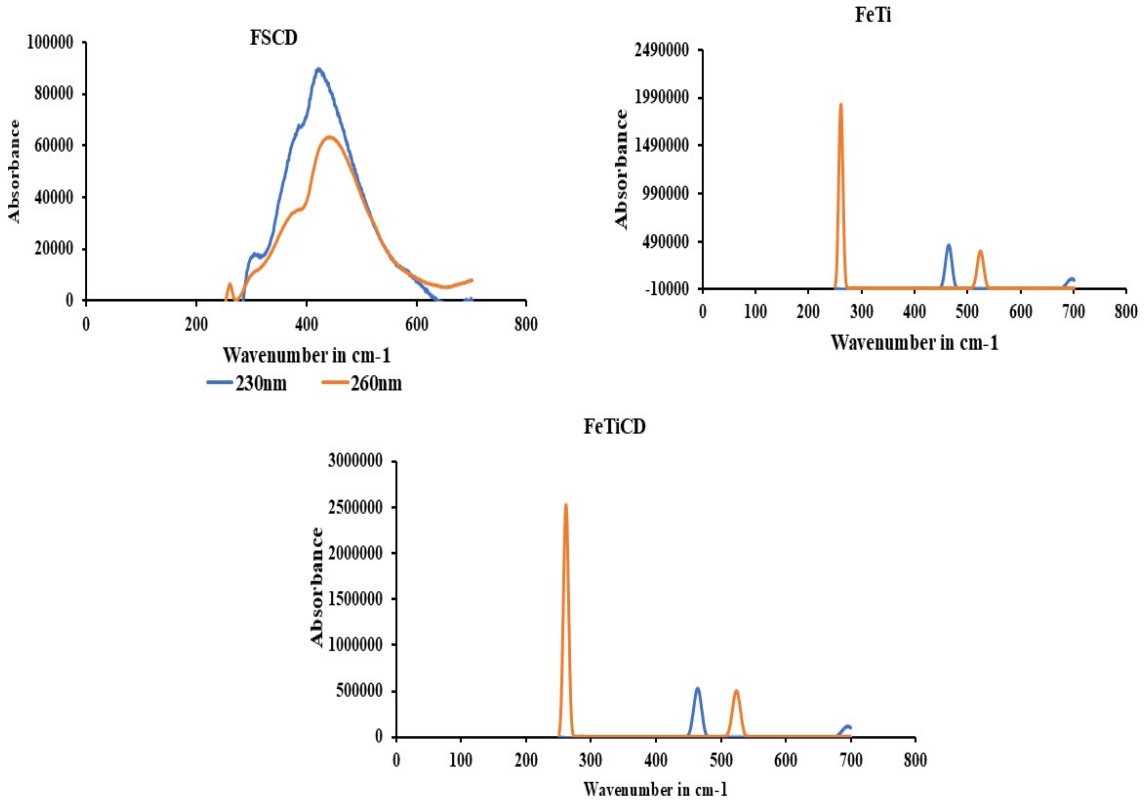


Figure S2. Fluorescence spectra of Fish skin carbon dot, FeTi and FeTiCD. The excitation wavelength used for the was 230 and 260 nm.

Table S1. FTIR Spectral data of FeTi and FeTiCD composite

FeTi	FeTiCD	CD [38]	Functional groups
	3440	3246, 3354	H bonded OH stretch
	2920, 2859	2872, 2929, 2962	C-H stretch assym/sym methyl /CH2
1700-1715	1700-1725	1715, 1732	C=O stretch
1657, 1644,1632	1642,1630		O-H bending
	1515,1507	1514	C=C aromatic ring stretch
1466, 1459, 1450, 1442	1470-1430	1454	C=C aromatic ring stretch
1400-1310	1400-1310	1402	Teritary O-H stretch
1124, 1113	1112, 1092	1110	O-H bending
1035	1037	1036	Ti-OH stretch
896	902		Ti-OH stretch
669	675		Ti-O-Ti
518	511		Fe-O stretch

Table S 2. Spectral data of silane pretreated and FeTiCD coated silane pretreated polyethylene aquaculture cage net

PE-Silane	PE-Silane + FeTiCD	Functional groups
795, 825, 848	796, 803, 818	- C-O-C Epoxy
902	891	- Si-O
948, 962 (doublet)	951	- Si-O asymmetric
1020	1015	- C-H stretch
1139	1145	- Si-O-C rocking strained
1251	1242	- C-O-C epoxy ring
1297, 1350	1265, 1300	- primary/secondary OH in plane bend
1365, 1408, 1400	1379,1389	- CH3 iso
	1413	C=C
1441, 1462, 1470	1463, 1471	- CH2 Stretch
	1532	- C=C Aromatic stretch
	1567, 1629	- C=C conjugation

	1645	- C=C Aryl substituted stretch
2630, 2648	2630, 2647(doublet)	- oxide peaks of silane
	2729	
2847	2849	– O CH3 stretch
2913	2917	- CH2 asymmetric stretch
2981- CH3	2968, 2981, 3008	asy/sym stretch
3392	3304, 3385	H bonded OH stretch
	3633, 3651	- OH primary stretch