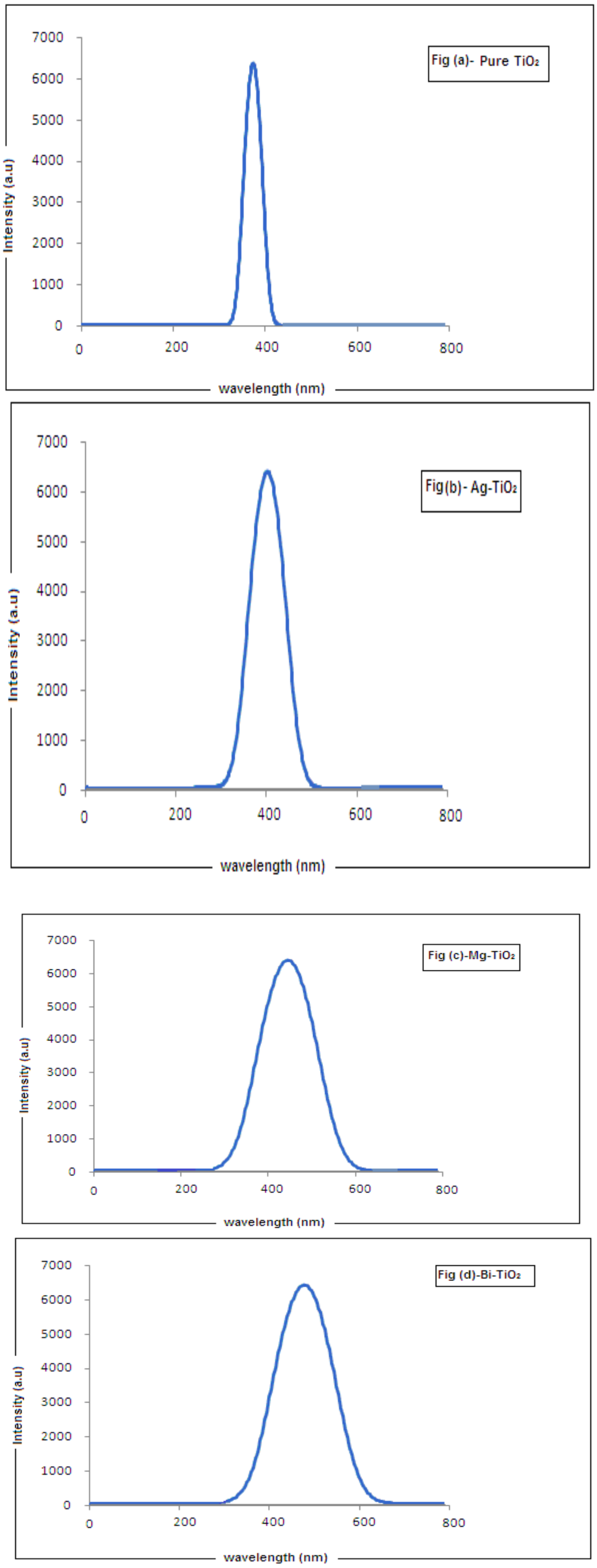

Figure 3: PL-studies of (a) Pure TiO_2 (b) Ag-TiO_2 (c) Mg -TiO_2 (d) Bi -TiO_2

3.4 Field Emission Scanning Electron Microscopy (FE-SEM) Analysis

Figure 4 shows the FESEM micrographs of the pure and doped TiO_2 nanoparticles prepared by acid modified sol-gel method. It has been observed that the TiO_2 nanoparticles annealed at 500ºC were almost reveals that the primary particles are quite uniform in size, quite clean and roughly spherical in shape, and that the agglomerates are fused together to form comparatively smaller irregular grains giving rise to highly porous materials which enhancing the photovoltaic performance. The FE-SEM micrographs of the pure TiO_2 nanoparticles depicted in figure (a) has non-uniform distribution of spherical particles.

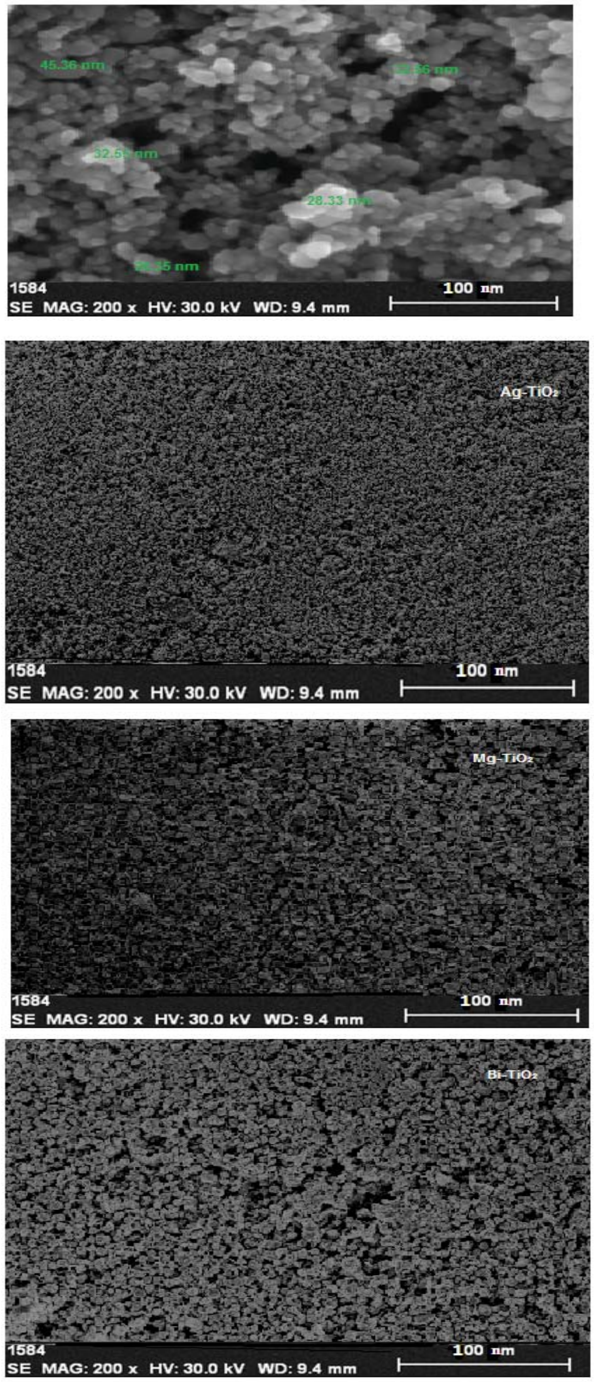

Figure 4: FESEM Micrographs (a) Pure TiO_2 (b) Ag-TiO_2 (c) Mg -TiO_2 (d) Bi -TiO_2

3.5 EDS Analysis

The semi quantification of elemental analyses to identify the weight percentage of major and minor elements present in the samples were done using Energy Dispersive X-ray Spectrometer (EDS),JEOL model, JSD-5610 LV with an accelerating voltage of 20KV. The result of energy dispersive X-ray spectroscopic (EDS) analysis of pure TiO_2 and doped TiO_2 nanopowders are shown in fig 5(a) & 5 (b, c & d). Trace elements are estimated by determining the percentage abundance of elements such as Ti, O & Zn present in the sample. In pure TiO_2 the concentration of titanium is 89.20% and the concentration of oxygen is 10.80% this result gives to the titanium and oxygen presents in sample.

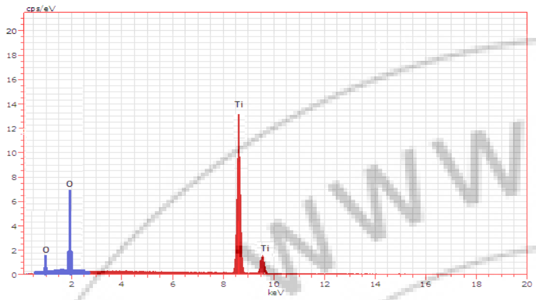

Figure 5 (a)

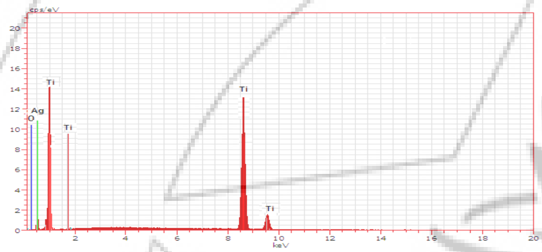

Figure 5 (a)

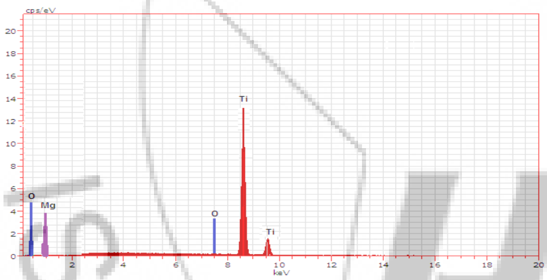

Figure 5 (c)

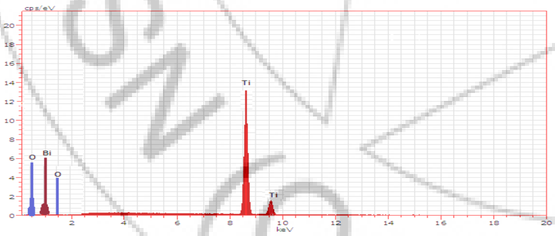

Figure 5 (d)

Figure 5: EDS Analysis (a) Pure TiO_2 (b) Ag-TiO_2 (c) Mg -TiO_2 (d) Bi -TiO_2

Table 2 (a)

Sample	*Element*	*Weight (%)*	*Atomic (%)*
Pure TiO_2	O K	32.16	61.40
	Ti K	67.84	38.60
	Total	100.00	100.00

Table -2 (b)

Sample	*Element*	*Weight (%)*	*Atomic (%)*
Ag- TiO_2	O K	35.25	63.60
	Ti K	61.45	34.25
	Ag K	3.30	2.15
	Total	100.00	100.00

Table -2 (c)

Sample	*Element*	*Weight (%)*	*Atomic (%)*
Mg- TiO_2	O K	36.34	65.55
	Ti K	59.40	31.30
	Mg K	4.26	3.15
	Total	100.00	100.00

Table 2 (d)

Sample	**Element**	**Weight (%)**	**Atomic (%)**
Bi- TiO_2	O K	33.55	62.33
	Ti K	60.23	33.42
	Bi K	6.22	4.25
	Total	100.00	100.00

Table 2: EDS Analysis (a) Pure TiO_2 (b) Ag-TiO_2 (c) Mg -TiO_2 (d) Bi -TiO_2

4. Conclusions

The pure and doped TiO_2 nanoparticles were successfully prepared by sol-gel method. The UV-Visible and PL result shows doped titanium nanoparticles extend the absorption edge to the visible light range and make the red shift more distinct and also analyses the band gap value. The Ti-O bond of anatase phase in all the synthesized samples was identified by FT-IR measurements. The FE-SEM analysis reveals that the morphology of doped TiO_2 was smooth and well defined spherical shape with grain size 25-50 nm with minimal agglomeration compare to pure TiO_2. Also analyses the morphology of doped TiO_2 was regular arrangement, spherical shape, uniform size, and good packing density. The doped and pure elements are identified from EDX spectrum, in which the spectrum confirms the elemental compositions of presented samples.

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