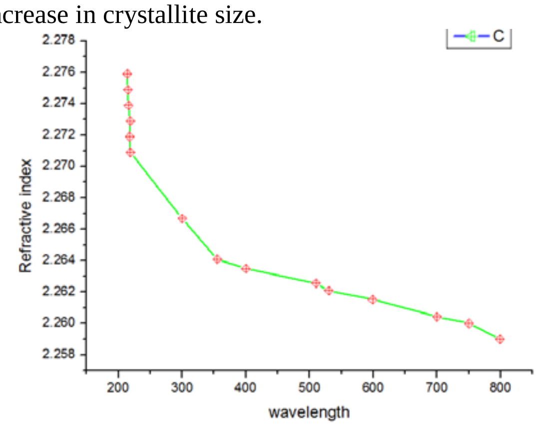
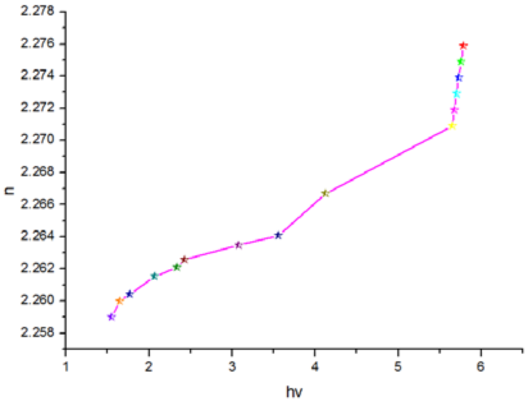
shows a linear relation with the photon energy (fig.6). The increase in refractive index is due to crystallization of the perovskite phase. The refractive index of perovskites is known to be proportional to their electronic polarization per unit volume which is inversely proportional to distance between atomic planes. This result can also be explained by an increase in crystallite size.



(a)



(b)

Figure 6: Variation **of** Refractive index **(n)** with (a) wavelength and (b) photon energy of ($PbSrBaTiO_6$).

Refractive index of the sample annealed at different temperatures can be calculated using Sellmeir dispersion formula [42].

The dispersion energy of the sample is calculated using the Wemple-DiDomenico (WD)model. Results are plotted graphically in (Fig.7).

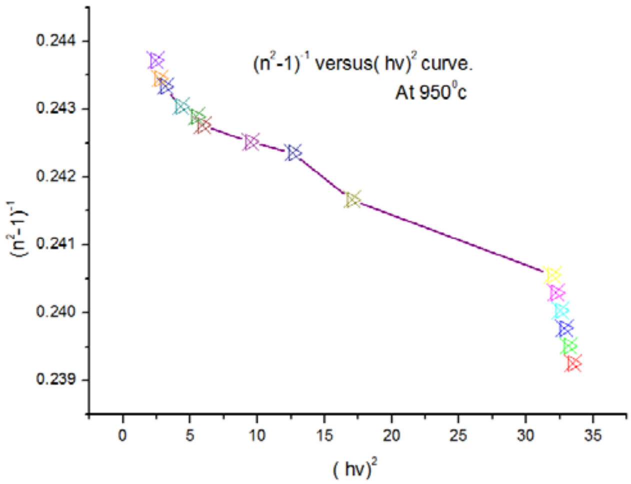
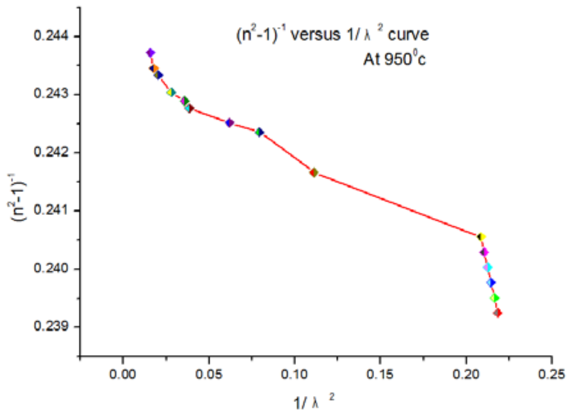


Figure 7: $(n^2-1)^{-1}$ versus$(hv)^2$ curve

The data of the dispersion of the refractive index (n) were evaluated according to the single oscillator model proposed by wimple and DiDomenico as, $n^2 = 1 + (E_dE_0)/(E_0^2-hv^2)$ ---- (7).

where E_o is the oscillator energy and E_d is the oscillator strength or dispersion energy.
Plotting of $(n^2-1)^{-1}$ against $(h\ v)^2$ allows to determine, the oscillator parameters, by fitting a linear function to the smaller energy data, E_o and E_d can be determined from the intercept, (E_o/E_d) and the slope $(1/E_oE_d)$. E_o is considered as an average energy gap to, it varies in proportion to the Tauc gap E_o~$2E_g$.

The oscillator model can be also written as $n^2-1=S_0\ \lambda_0^2/[1-(\lambda o\ /\ \lambda)^2\ ]$ --- (8) where λ is the wavelength of the incident radiation , S_o is the average oscillator strength and λ_o is an average oscillator wavelength.
The curves of $(n^2 – 1)^{-1}$ against $(1/\lambda^2)$ (Fig.8) are fitted into straight lines following the sell Meier's dispersion formula . The value of S_o and (λ_o) are estimated from the slope (1/So) and the infinite wavelength intercept $(1/S_0\ \lambda_o)^{\ 2}$. The optical parameters of the sample were calculated and listed in the table.2 given below.



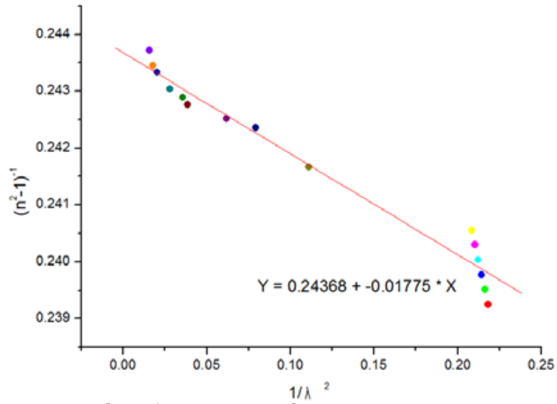


Figure 8: $(n^2-1)^{-1}$ versus $1/\lambda^2$ curve (curve and linear fit)

Table 2: The optical parameters of ($PbSrBaTiO_6$) calculated.

sample	E_g (eV)	E_O(eV)	E_d(eV)
at 800◦C	4.71	9.42	5.9806
At 950◦C	5.24	10.48	5.3757

It is clear that as the temperature is increased, band gap energy increases or E_0 increases respectively. The dispersion energy also shows a decline as the temperature rises and the sample attains its perosvkite phase. The curve with straight line graphs confirms the sell Meier's dispersion formula. Further the mechano chemical process has an advantage due to low-costs and widely available materials, leading to a simplified process.

4. Conclusion

The UV emission peak shifts significantly to higher wavelengths with increasing annealing temperatures. The increase in the band gap energy increases the dielectric properties of the material. It is confirmed that tunable band gaps are obtained by varying annealing temperatures. Band gap energy and The optical properties of the nano ceramic material $PbSrBaTiO_6$ can be taken as a better candidate for UV_VIS shielding applications. Optical measurements confirmed that absorbance and reflectance increases with temperature. According to Wemple- DiDomenico single-oscillator model the dispersion energy decreases as the sample attains its perosvkite phase. As the band gap energy increases at high temperature the material becomes more dielectric. For new generation capacitors nano crystalline ceramics $PbSrBaTiO_6$ materials will prove as a future substitute.

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