each common well thickness value the while colored rows are for TE mode and shaded rows are for TM mode. It is observed that the maximum gain again follows the same trend it increases as bt is increased to 55 in TE mode and 40, 55 or 70 for TM mode thereafter the maximum is decreasing as bt increases. Again the maximum gain obtained is 0.7896 in TM mode at bt 40 and wt=10 while in TE mode maximum gain is 0.4699 at bt=55 and wt=250.Again in both modes maximum gain is found to be increasing as wt is increased as bt is kept constant but in TM mode the maximum gain is significantly high at wt =10 and then it reduces for wt= 30 and 50 and then the maximum gain is increasing.

Similar tables are generated for x=0.81,0.84,0.87 and 0.9 for different relaxation time rt at 1,5,10 and 20.The maximum gain values and respective wavelength, bt, wt and value in eV are tabulated for both TE and TM mode in table 3(a) and (b).

			Table 2:		
			(TE mode at rt=1)		
x	**bt**	**wt**	**gmax**	**lmda**	**eV**
0.75	40	250	0.4246	1.9314	0.6427
0.78	40	250	0.4777	2.0092	0.6178
0.81	40	250	0.5335	2.0924	0.5932
0.84	40	250	0.5728	2.1818	0.5689
0.87	55	250	0.6378	2.278	0.5449
0.9	55	250	0.6943	2.3818	0.5211
0.93	55	250	0.7415	2.4941	0.4977
0.96	55	250	0.802	2.6159	0.4745
0.99	55	250	0.8574	2.7486	0.4516
			(TE mode at rt=5)		
x	**bt**	**wt**	**gmax**	**lmda**	**eV**
0.75	40	250	0.085	1.9314	0.6427
0.78	40	250	0.096	2.0092	0.6178
0.81	40	250	0.1068	2.0924	0.5932
0.84	40	250	0.1146	2.1818	0.5689
0.87	55	250	0.1277	2.278	0.5449
0.9	55	250	0.1387	2.3818	0.5211
0.93	55	250	0.1486	2.4941	0.4977
0.96	55	250	0.1604	2.6159	0.4745
0.99	55	250	0.1716	2.7486	0.4516
			(TE mode at rt=10)		
x	**bt**	**wt**	**gmax**	**lmda**	**eV**
0.75	40	250	0.0425	1.9314	0.6427

0.78	40	250	0.0483	2.0092	0.6178
0.81	40	250	0.0534	2.0924	0.5932
0.84	40	250	0.0571	2.1818	0.5689
0.87	55	250	0.064	2.278	0.5449
0.9	55	250	0.0694	2.3818	0.5211
0.93	55	250	0.0743	2.4941	0.4977
0.96	55	250	0.0802	2.6159	0.4745
0.99	55	250	0.0858	2.7486	0.4516
			(TE mode at rt=20)		
x	**bt**	**wt**	**gmax**	**lmda**	**eV**
0.75	40	250	0.0214	1.9314	0.6427
0.78	40	250	0.0237	2.0092	0.6178
0.81	40	250	0.0267	2.0924	0.5932
0.84	40	250	0.0285	2.1818	0.5689
0.87	55	250	0.0319	2.278	0.5449
0.9	55	250	0.0346	2.3818	0.5211
0.93	55	250	0.037	2.4941	0.4977
0.96	55	250	0.0399	2.6159	0.4745
0.99	55	250	0.0429	2.7486	0.4516
			(TM mode at rt=1)		
x	**bt**	**wt**	**gmax**	**lamda**	**eV**
0.75	40	10	0.8358	1.3511	0.9187
0.78	40	10	0.7896	1.3878	0.8944
0.81	40	10	0.8622	1.4082	0.8814
0.84	40	10	0.9909	1.4479	0.8572
0.87	40	50	1.3512	1.545	0.8033
0.9	40	50	2.7015	1.5821	0.7845
0.93	40	50	2.6587	1.6204	0.766
0.96	40	70	3.4048	1.7133	0.7245
0.99	40	50	3.6839	1.679	0.7393
			(TM mode at rt=5)		
x	**bt**	**wt**	**gmax**	**lamda**	**eV**
0.75	40	10	0.1672	1.3511	0.9187
0.78	40	10	0.1579	1.3878	0.8944
0.81	40	10	0.1725	1.4082	0.8814
0.84	40	10	0.1992	1.4479	0.8572
0.87	40	50	0.2702	1.545	0.8033
0.9	40	50	0.5408	1.5821	0.7845
0.93	40	50	0.532	1.6204	0.766

0.96	40	70	0.6814	1.7133	0.7245
0.99	40	50	0.7368	1.679	0.7393
			(TM mode at rt=10)		
x	**bt**	**wt**	**gmax**	**lamda**	**eV**
0.75	40	10	0.0836	1.3511	0.9187
0.78	40	10	0.079	1.3878	0.8944
0.81	40	10	0.0863	1.4082	0.8814
0.84	40	10	0.0996	1.4479	0.8572
0.87	40	50	0.1351	1.545	0.8033
0.9	40	50	0.2703	1.5821	0.7845
0.93	40	50	0.2658	1.6204	0.766
0.96	40	70	0.3406	1.7133	0.7245
0.99	40	50	0.3683	1.679	0.7393
			(TM mode at rt=20)		
x	**bt**	**wt**	**gmax**	**lamda**	**eV**
0.75	40	10	0.0418	1.3511	0.9187
0.78	40	10	0.0395	1.3878	0.8944
0.81	40	10	0.0431	1.4082	0.8814
0.84	40	10	0.0498	1.4479	0.8572
0.87	40	50	0.0676	1.545	0.8033
0.9	40	50	0.1352	1.5821	0.7845
0.93	40	50	0.1329	1.6204	0.766
0.96	40	70	0.1703	1.7133	0.7245
0.99	40	50	0.1841	1.679	0.7393

After gathering all the results for the AlGaAs/GaAs the variations in the values of gain, energy and wavelength for both TE and TM mode with respect to barrier thickness, well thickness, concentration, relaxation time are observed .Fig 2 (a) shows the variation of maximum gain with respect to barrier thickness at different concentration x. In this case wt and rt is kept constant wt=250 and rt=1 is chosen for this plot because the AlGaAs hetero structure provided maximum gain rt=1 and wt=250 in TE mode as referred to table 2. Here it can be observed that barrier thickness is varying from 10 to 150 and gain initially rises and attains maximum value at bt =40 for x=0.75 and it reduces gradually. It can also be observed that as the concentration x is enhanced from 0.75 to 0.99 gain is increases. Similarly fig 2 b represents the gain vs. barrier thickness for TM mode. It can be observed that at lower concentration x=0.75 there is no significant change in the gain but as the concentration increases gain significantly uprises and it shows its peak value at bt =40 or 50. After bt=50 the gain again goes on decreasing in this case the maximum gain is obtained at 3.689 in TM mode at bt=40 for wt =50 while for the same scenario max

gain is 0.8574 in TE mode at wt=250 and bt=55.

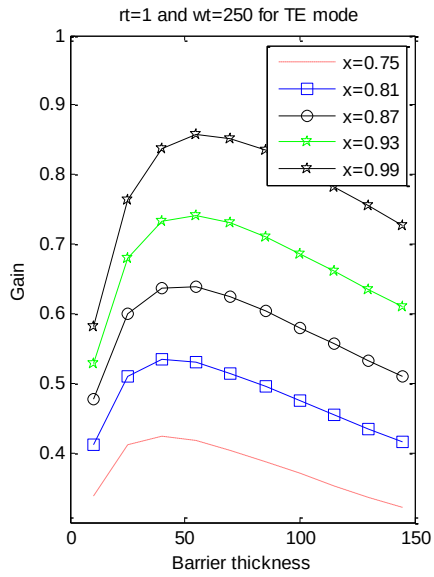


Figure 2(a): Max. Gain vs. Barrier Thickness at different concentration x in TE mode.

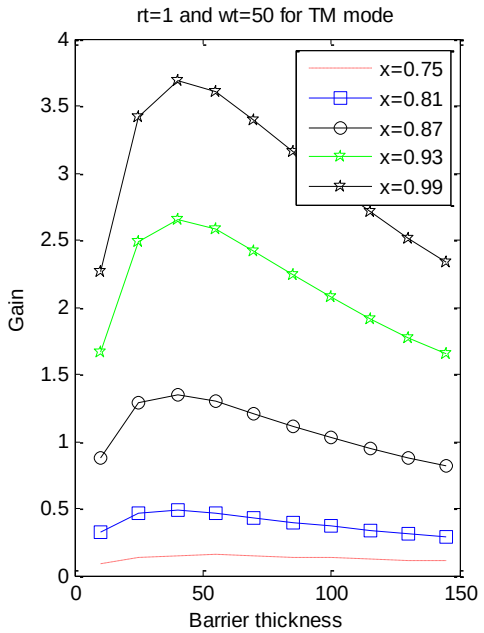


Figure 2(b): Max. Gain vs. Barrier Thickness at different concentration x in TM mode.

For these values of maximum gain the respective wavelength and energy in eV is obtained. In the case of TE mode wavelength is 2.4786 and energy is 0.4516 eV for bt=55, wt=250, x=0.99 and max gain is 0.8574 at rt=1 while in TM mode lambda =1.679 and energy =0.7393eV for bt=40 wt=50, x=0.99 and rt=1 with gain 3.6839.

Plots to demonstrate the variations in the values of energy for both TE and TM mode with respect to barrier thickness, well thickness concentration and relaxation time are also shown. In Fig 2 (c and d) the value of energy (eV) with respect to barrier thickness at different concentration x. In this case wt=250 and rt=1 with similar cause as in figure 2(a and b). Here it can be observed as barrier thickness varied from 10 to 150 and energy is kept constant irrespective to bt. But it is observed that as the concentration x is enhanced from 0.75 to 0.99 energy decreases. Similarly fig 2 (d) represents the energy vs. barrier thickness for TM mode. It can be observed that at higher concentration x=0.99 the energy is lowest that is 0.65 ev and it is kept constant irrespective to bt. As the concentration is further enhanced there is a significant rise in energy and as the concentration further decreased from 0.99 to 0.75 the energy increased from 0.65 to 0.85.

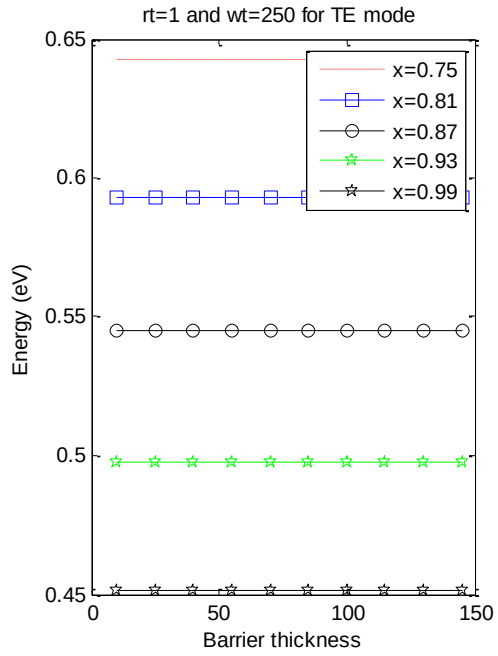


Figure 2(c): Energy(eV) vs. Barrier Thickness at different concentration x in TE mode.

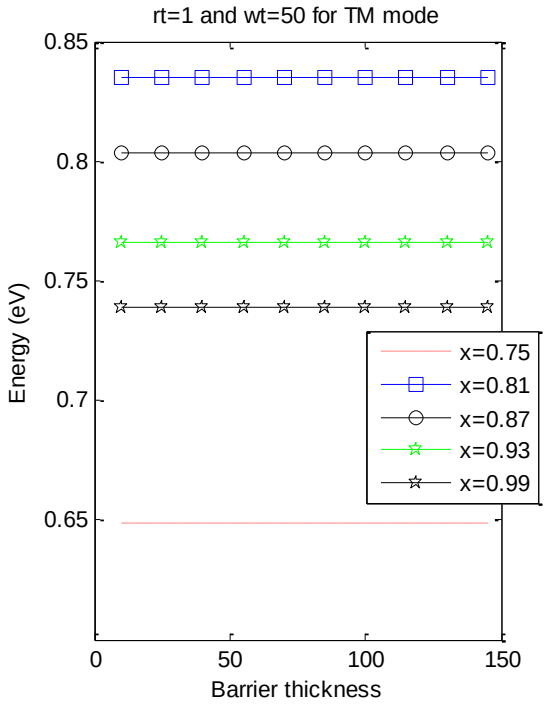


Figure 2(d): Energy(eV) vs. Barrier Thickness at different concentration x in TM mode.

Fig 2 (e and f) shows the value of wavelength with respect to barrier thickness at different concentration x. In this case wt=250 and rt=1 with similar cause as in figure 2(a and b). Here it can be observed as barrier thickness varied from 10 to 150 and wavelength is kept constant irrespective to bt. But it is observed that as the concentration x is enhanced from 0.75 to 0.99 energy decreases. Similarly fig 2 (b) represents the wavelength vs. barrier thickness for TM mode. It can be observed that at higher concentration x=0.99 the wavelength is lowest that is 1.5 and it is kept constant irrespective to bt. As the concentration is further decreased there is a significant rise in wavelength and as the concentration gradually decreased from 0.99 to 0.75 the wavelength increased from 1.5 to 1.9314.

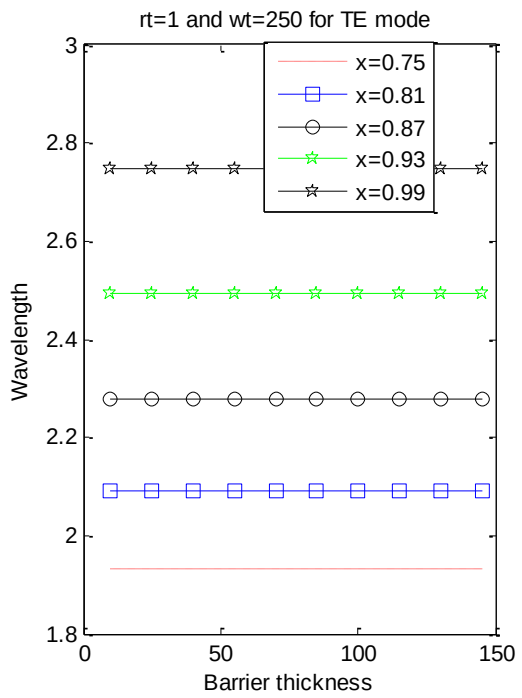


Figure 2(e): Wavelength vs. Barrier Thickness at different concentration x in TE mode.

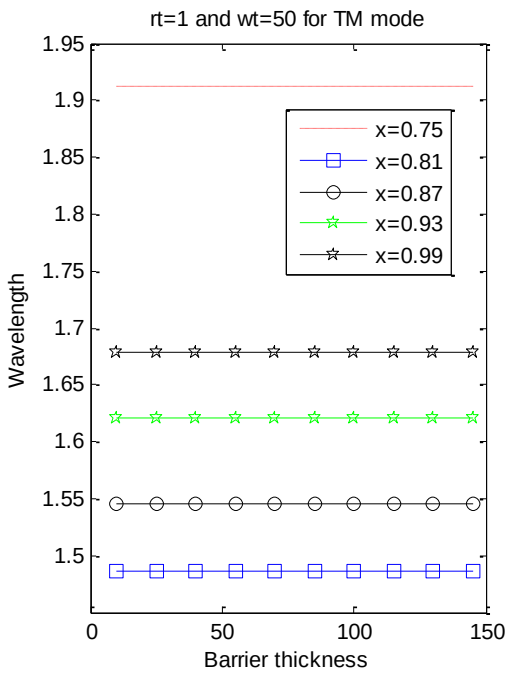


Figure 2(f): Wavelength vs. Barrier Thickness at different concentration x in TM mode.

Similar to the gain vs. barrier thickness results, in this section we are going to discuss the effect of well thickness over the gain spectrum ,energy(ev) and wavelength for TE and TM mode. Figure 3 a shows the variation of gain at rt=1 and bt =55 for TE mode at different concentration x varying from 0.75 to 0.99 for AlGaAs/ GaAs hetero structure .In this plot we can observe that as the well thickness increases from 0 to 250, the gain is increasing from 0.055 to 0.85 approximately and as the concentration x is increased we can observed that gain is getting higher at the similar well thickness hence both parameters well thickness and concentration increases the gain value at a given barrier thickness. Similarly we have plotted results for the TM mode shown in figure in 3 (b). In this figure the variation of gain is different for the TE mode. We can observe that for all the concentration x the well thickness is increased. First of all the gain is abruptly rising and as the well thickness near about 50 the gain attain its maximum value and there after wt is further increased the gain decreases gradually and after wt larger than 150 the gain variation is almost saturated .In this case the maximum obtained gain is 3.603 at wt=50 and x=0.99. Again we can observe that at TM mode as the concentration x is increased the gain is getting higher at same well thickness.

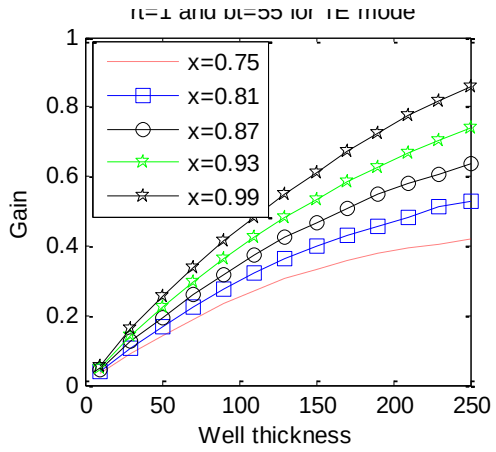


Figure 3(a): Gain vs. Well Thickness at different concentration x in TE mode.

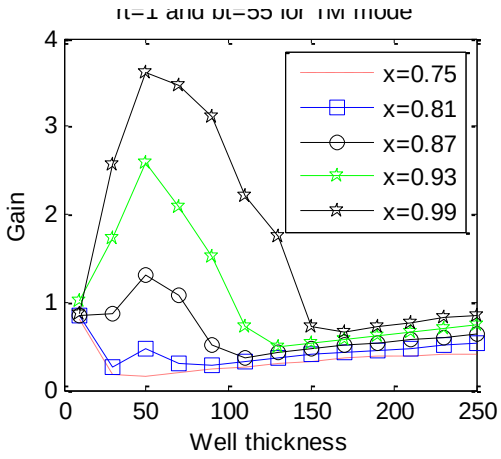


Figure 3(b): Gain vs. Well Thickness at different concentration x in TM mode.

After analysis of gain we have taken out the value of energy (ev) and wavelength and plotted these as the function of well thickness as shown in figure at 3(c). As the variation of energy with respect to well thickness in TE and TM mode. In these figure we can observe that for TE mode as the well thickness is increasing energy decreasing upto wt =50 and for wt greater than 50 energy variation are almost negligible. As the concentration is increasing energy values decreasing on same value of the well thickness for TE mode but for TM mode there is large fluctuation in the energy for x=0.81 while for the x=0.75,0.87 and 0.93 energy is initially decreasing thereafter its is saturated for higher value of well thickness. The lowest energy value is obtained at x=0.99.

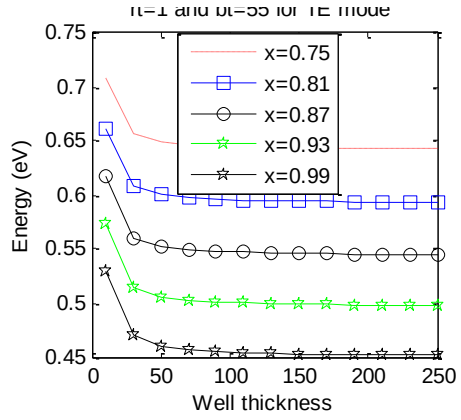


Figure 3(c): Energy (eV) vs. Well Thickness at different concentration x in TE mode.

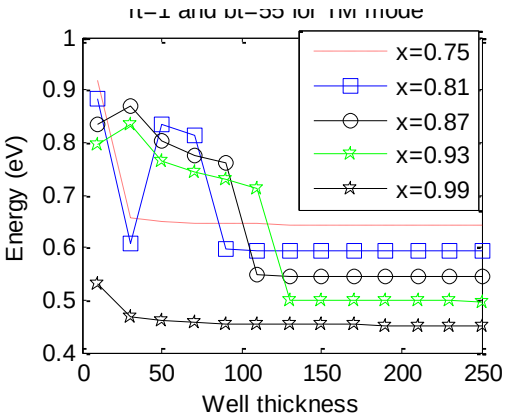


Figure 3(d): Energy (eV) vs. Well Thickness at different concentration x in TM mode.

Similar variation is also observed in the case of wavelength. However wavelength is

initially increasing with respect to well thickness thereafter as wt is getting higher wt is getting consistent. The maximum wavelength obtained here is 2.73 approximately at x= 0.99 for both TE & TM mode at rt=1 and bt=55.

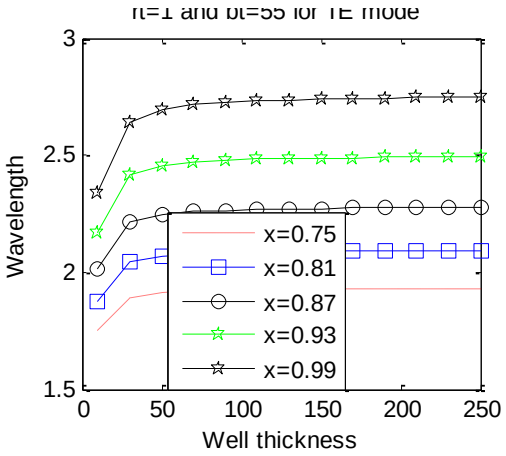


Figure 3(e): Wavelength vs. Well Thickness at different concentration x in TE mode.

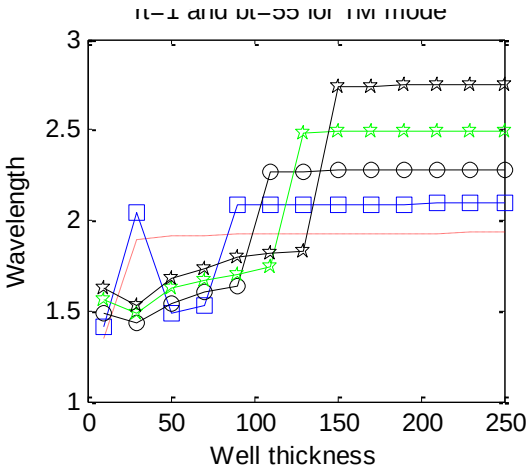


Figure 3(f): Wavelength vs. Well Thickness at different concentration x in TM mode.

Figure 4(a) and 4 (b) are showing the variation of maximum gain with respect to relaxation time rt, where rt is varied from 1 to 20 and maximum gain values are recorded at a particular concentration x ,bt and wt that values of maximum gain are plotted against rt and it has been observed that for lower rt the gain is very large and the rt is increases as the gain drops abruptly and at higher rt i.e. about 10 the variation in gain becomes very small in both TE and TM mode, maximum gain is and as the concentration is increased the gain is getting higher at same rt.

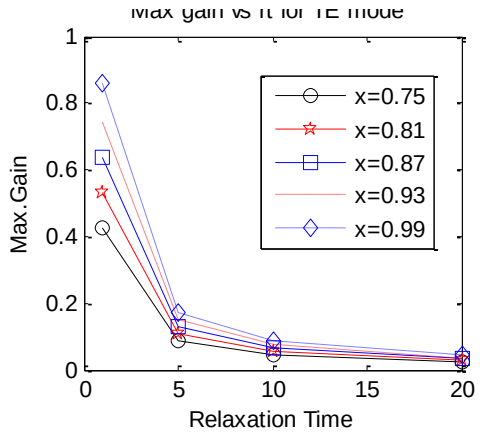


Figure 4 (a): Gain vs. relaxatation time at different concentration x in TE mode.

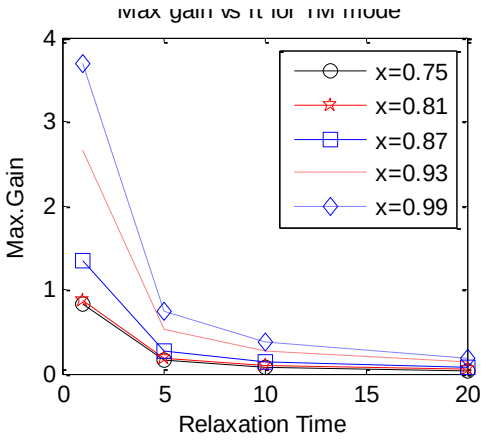


Figure 4(b): Gain vs. relaxatation time at different concentration x in TM mode.

Similarly energy vs. rt plots are shown in figure 4(c) and 4 (d). In both the plots it has been found that energy and wavelength is independent of change of rt they remain constant. Maximum wavelength that has been observed is 2.7 in TE mode and 1.68 in TM mode at all rt varying from 1 to 20.

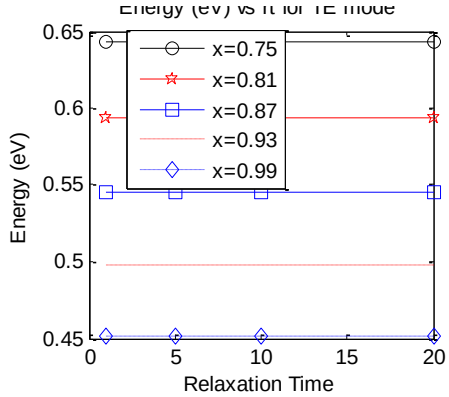


Figure 4(c): Energy (eV) vs. relaxatation time at different concentration x in TE mode.

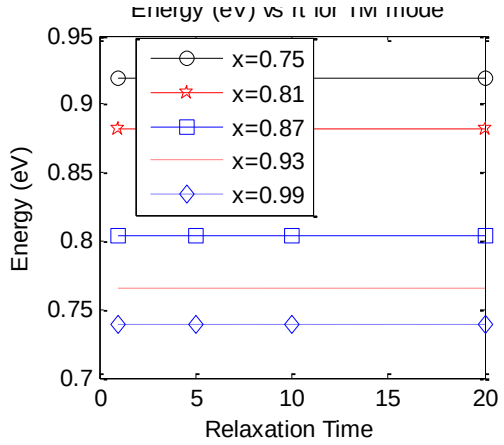


Figure 4(d): Energy (eV) vs. relaxatation time at different concentration x in TM mode.

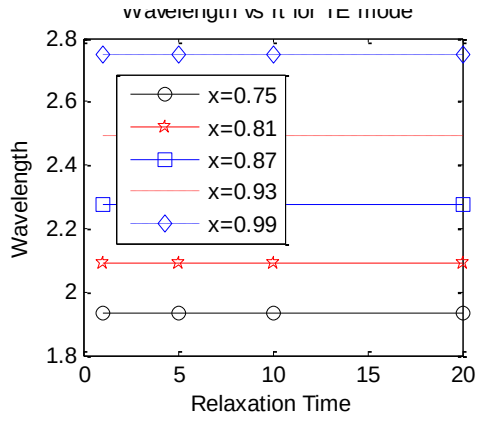


Figure 4(e): Wavelength vs. Well Thickness at different concentration x in TE mode.

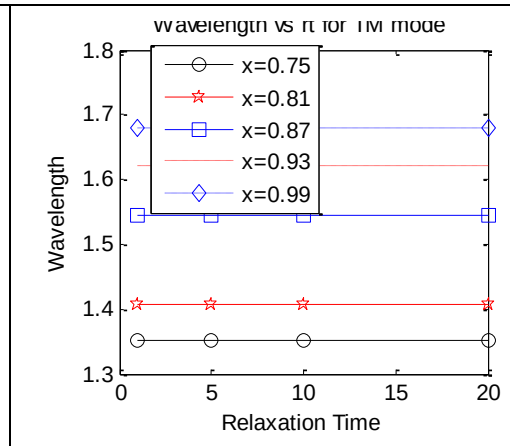


Figure 4(f): Wavelength vs. Well Thickness at different concentration x in TM mode.

In this section here the same work of AlGaAs hetero structure is repeated for another laser hetero structure named as InGaAs/GaAs. The same algorithm is applied to observe the variation of gain spectrum, energy, lambda with respect to bt, wt, rt and concentration(x).The values of these parameters are described below wt =20 to 240 μm and bt=10 to 145μm and rt=0.5,0.3,0.1,0.09,0.05,0.02. The rt values are taken to

be 0.5 and gradually decreased to 0.02 for getting the gain spectrum at different concentration of x=0.8,0.84,0.87,0.9,0.93,0.96,0.99 for all these parametric values gain spectrum as a function of lambda are plotted and the maximum gain values is again recorded at different bt, wt, rt and x.

Table 2.1 :Max gain in TM Mode x=0.99										
0	10	25	40	55	70	85	100	115	130	145
20	0.001428	0.0018	0.001761	0.00155	0.00136	0.00120	0.00106	0.00096	0.00086	0.00079
40	0.00225	0.002711	0.00252	0.00223	0.00197	0.00175	0.00157	0.00142	0.00129	0.00118
60	0.008167	0.009364	0.008678	0.00775	0.00691	0.00619	0.00558	0.00508	0.00465	0.00429
80	0.014924	0.016515	0.015323	0.01379	0.01239	0.01118	0.01016	0.00930	0.00856	0.00792
100	0.02634	0.028386	0.026404	0.02394	0.02167	0.01969	0.01800	0.01655	0.01531	0.01422
120	0.057914	0.061157	0.057054	0.05207	0.04744	0.04338	0.03987	0.03683	0.03419	0.03189
140	0.088892	0.092396	0.086455	0.07937	0.07274	0.06687	0.06175	0.05728	0.05338	0.04995
160	0.15593	0.16007	0.15021	0.13861	0.1277	0.11797	0.1094	0.10188	0.09525	0.08939
180	0.21911	0.22271	0.20954	0.19425	0.17981	0.16681	0.1553	0.14512	0.1361	0.12808
200	0.2981	0.30061	0.28353	0.26394	0.24533	0.22848	0.21346	0.20009	0.18819	0.17754
220	0.43173	0.43259	0.40895	0.38209	0.35649	0.33318	0.31226	0.29355	0.2768	0.26175
240	0.56119	0.55942	0.52997	0.49681	0.4651	0.43607	0.40989	0.38634	0.36515	0.34604

Table 2.1 shows one of the example that has been recorded for maximum gain values at x=0.99 and rt=0.02 to 0.5 , in the TM mode. In this table the rows are varying from 20 to 240 representing the values of wt and columns 10 to 25 representing the values of bt in µm .We can observe in this table the value of maximum gain at different bt and wt at a particular x and rt. Similarly various tables are generated for all the combinations of concentration x, time rt for both TE and TM mode. The summarized results of these tables are shown in table 2.2. In this table first column is for the concentration i.e. varying from 0.8 to 0.99 and second column and third column values of bt and wt at which we are getting maximum gain. The maximum gain is given as gmax in fourth ,fifth and sixth column are representing the respective wavelength energy associated with given bt and wt at which we are getting maximum gain .In this table we can see rt is varying from 0.02 to 0.5 and maximum gain is varying as the concentration is changed at particular rt. We can observe at rt=0.1 maximum gain is varying from $3.6*10^{-5}$ to 0.011417 as x is increased and the value of wavelength is auto changing for 0.776 to 0.8918 and is proportional to wavelength, energy is also gradually decreasing from 1.5 to 1.2.Similarly the values are recorded for different rt as shown in subsequent rows of this table.

Table 2.2 :Max gain in TE Mode x=0.99										
0	10	25	40	55	70	85	100	115	130	145
20	0.00143	0.00187	0.00177	0.00156	0.00137	0.00121	0.00107	0.00096	0.00087	0.00079
40	0.00227	0.00273	0.00254	0.00225	0.00199	0.00177	0.00158	0.00143	0.00130	0.00119
60	0.00829	0.00950	0.00881	0.00787	0.00701	0.00628	0.00567	0.00516	0.00472	0.00435
80	0.01507	0.01668	0.01547	0.01393	0.01252	0.01130	0.01027	0.00939	0.0086	0.00800
100	0.02678	0.02886	0.02684	0.02434	0.02203	0.02002	0.01830	0.01683	0.01556	0.01446
120	0.058784	0.06207	0.05791	0.05285	0.04816	0.04403	0.04047	0.03738	0.03471	0.03237
140	0.089623	0.09315	0.08716	0.08002	0.07334	0.06742	0.06225	0.05775	0.05382	0.05036
160	0.15732	0.16149	0.15154	0.13984	0.12884	0.11901	0.11037	0.10278	0.09609	0.09018
180	0.22161	0.22525	0.21193	0.19647	0.18186	0.16872	0.15707	0.14677	0.13765	0.12954
200	0.30132	0.30385	0.28659	0.26678	0.24797	0.23095	0.21576	0.20225	0.19022	0.17946
220	0.43546	0.43634	0.41249	0.3854	0.35958	0.33607	0.31497	0.29609	0.27919	0.26401
240	0.5653	0.56352	0.53385	0.50045	0.4685	0.43927	0.41289	0.38917	0.36782	0.34857

Table 2.2		**(TE mode at rt=0.1)**			
X	**bt**	**wt**	**gmax**	**lmda**	**eV**
0.81	10	240	3.60E-05	0.77605	1.5994
0.84	10	240	3.41E-05	0.7936	1.564
0.87	10	220	1.16E-05	0.81182	1.5289
0.9	25	160	2.04E-06	0.83074	1.4941
0.93	10	240	0.000287	0.85029	1.4597
0.96	10	240	0.003647	0.87066	1.4256
0.99	10	240	0.011417	0.8918	1.3918
		(TE mode at rt=0.02)			
X	**bt**	**wt**	**gmax**	**lmda**	**eV**
0.81	25	160	3.82E-05	0.77612	1.5992
0.84	25	180	4.28E-05	0.79365	1.5639
0.87	10	220	3.63E-05	0.81182	1.5289
0.9	25	200	4.34E-05	0.83072	1.4941
0.93	10	240	0.014705	0.85029	1.4597
0.96	10	240	0.1837	0.87066	1.4256
0.99	10	240	0.5653	0.8918	1.3918
		(TE mode at rt=0.3)			

X	**bt**	**wt**	**gmax**	**Imda**	**eV**
0.81	10	240	0	0.776	1.5994
0.84	25	120	0	0.7937	1.5639
0.87	10	220	0	0.8118	1.5289
0.9	25	160	0	0.8307	1.4941
0.93	10	240	0.0006	0.8503	1.4597
0.96	10	240	0.0073	0.8707	1.4256
0.99	10	240	0.0228	0.8918	1.3918
		(TE mode at rt=0.05)			
X	**bt**	**wt**	**gmax**	**lmda**	**eV**
0.81	10	240	4.50E-05	0.77605	1.5994
0.84	10	240	4.26E-05	0.7936	1.564
0.87	25	100	3.23E-05	0.81183	1.5289
0.9	25	160	4.07E-05	0.83074	1.4941
0.93	10	240	0.005883	0.85029	1.4597
0.96	10	240	0.073411	0.87066	1.4256
0.99	10	240	0.22629	0.8918	1.3918
		(TE mode at rt=.5)			
X	**bt**	**wt**	**gmax**	**lmda**	**eV**
0.81	10	240	0	0.776	1.5994
0.84	25	120	0	0.7937	1.5639
0.87	10	220	0	0.8118	1.5289
0.9	25	160	0	0.8307	1.4941
0.93	10	240	0.0006	0.8503	1.4597
0.96	10	240	0.0073	0.8707	1.4256
0.99	10	240	0.0228	0.8918	1.3918
		(TM mode at rt=.09)			
X	**bt**	**wt**	**Gmax**	**lmda**	**eV**
0.81	10	200	4.20E-05	0.77608	1.5993
0.84	10	240	4.73E-05	0.7936	1.564
0.87	10	220	3.23E-05	0.81182	1.5289
0.9	25	160	2.26E-05	0.83074	1.4941
0.93	10	240	0.003287	0.85029	1.4597
0.96	10	240	0.04074	0.87066	1.4256
0.99	10	240	0.12554	0.8918	1.3918

In the fig 5 (a) and (b) we have shows various of maximum gain with respect to barrier thickness thickness in TE and TM mode. Here we can observe that maximum gains for both modes are different. In TE mode as the barrier thickness is increases gain is decreasing almost linearly but in the TM mode initially gain rises thereafter it goes on decreasing. The maximum gain is obtained at bt =10 having values 0.5653 at rt=0.2 and wt =240 for x=0.99 while in the TM mode the maximum gain is 0.009364 at bt=25.Hence the gain in the TE mode is larger as compared to the TM mode.

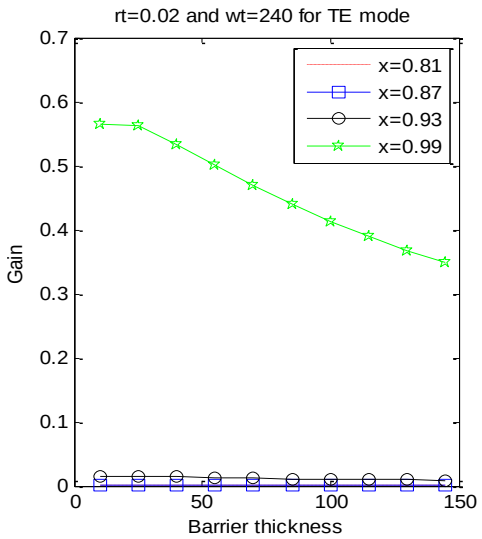


Figure 5 (a) : Maximum gain with respect to barrier thickness TE mode.

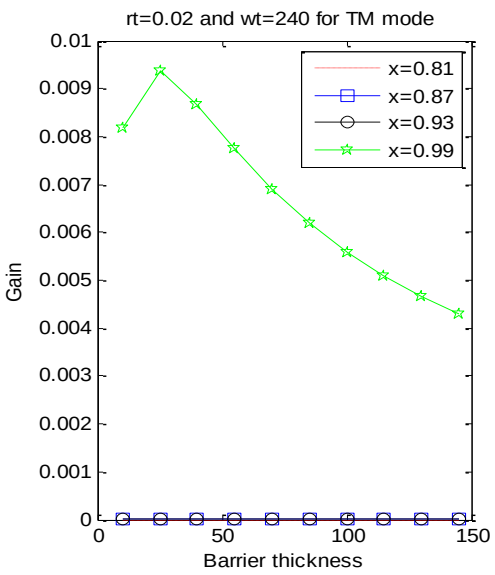


Figure 5 (b): Maximum gain with respect to barrier thickness TM mode.

Fig 5(c) and (d) are showing plots of energy and lambda with respect to the barrier thickness. In both modes it is observed that energy and lambda are independent of barrier thickness they remains constant and the bt is changed from 10 to 145. The respective values of lambda and energy can be observed in these plots and it can also be found that as the concentration is increasing and energy is decreasing respectively. The wavelength that have been obtained in association with the maximum gain is (0.776, 0.8118, 0.8503, 0.8918) at the concentration x equal to 0.81, 0.87,0.93, 0.99 for TE mode.

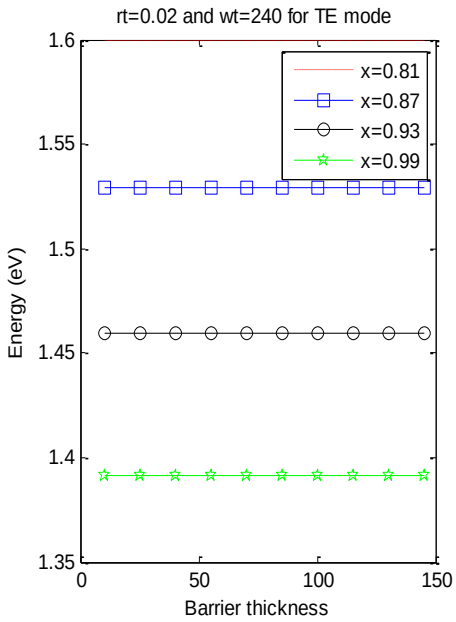
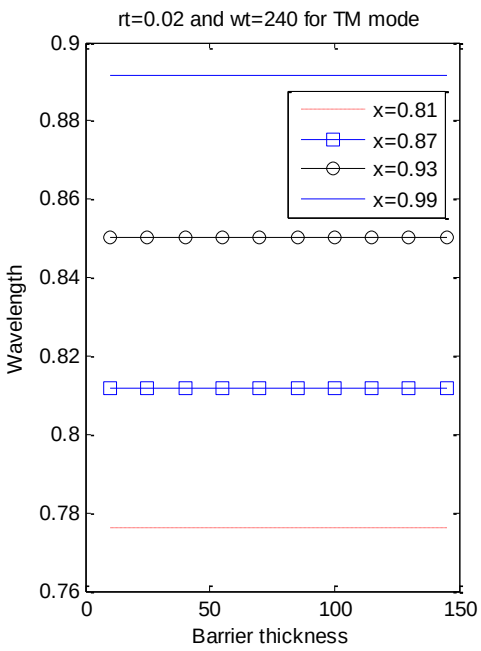


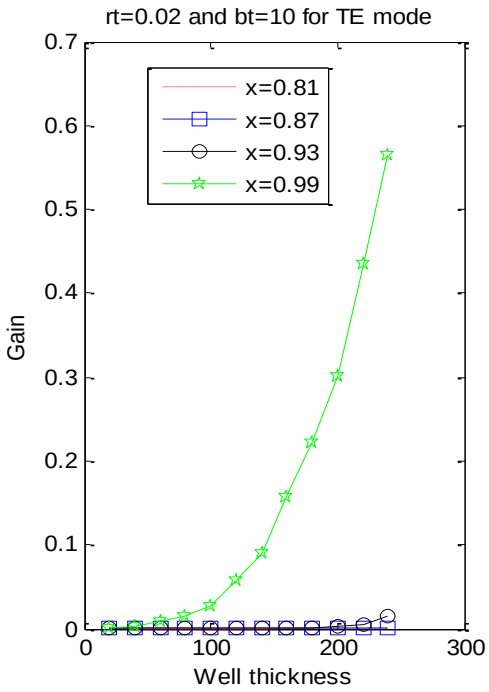
Fig 5 (c):wavelength w.r.t barrier thickness TE mode.



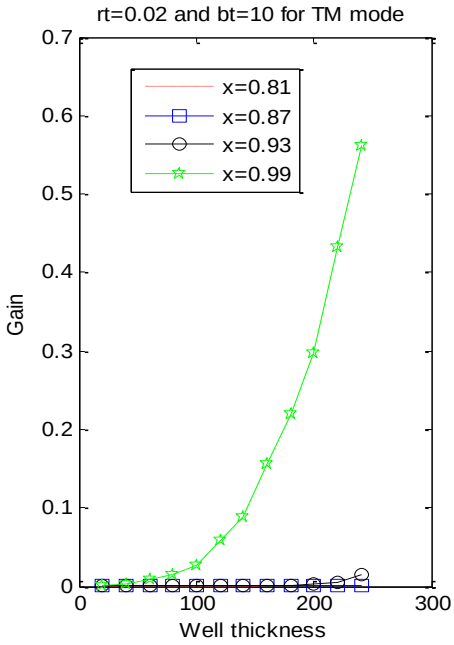
5(d) : Wavelength w.r.t barrier thickness TM mode.

Fig 6(a),(b) are representing the variations of gain with respect to well thickness. In both cases we can observe that as the well thickness is increased gain is increasing. The maximum gain is obtained at wt=40 having value 0.5653 for TE mode and 0.5612 for TM mode .Fig 6(c) and (d) are displaying plots for energy as a function of wt for TE and TM mode. In this fig it can be observed that as the wt is increased there is very small change in the energy at initial values of wt but for higher values energy is almost independent of changes of wt. As the concentration is increased energy is decreasing at the same value of well thickness.

In the fig 6(e) and (f) we have shown variations of lambda with respect to well thickness they are also independent of well thickness but as the concentration is changed wavelength is increasing at the same values of well thickness.



6(a): Variations of max. gain with respect to well thickness in TE mode.



6(b): Variations of max. gain with respect to well thickness in TM mode.

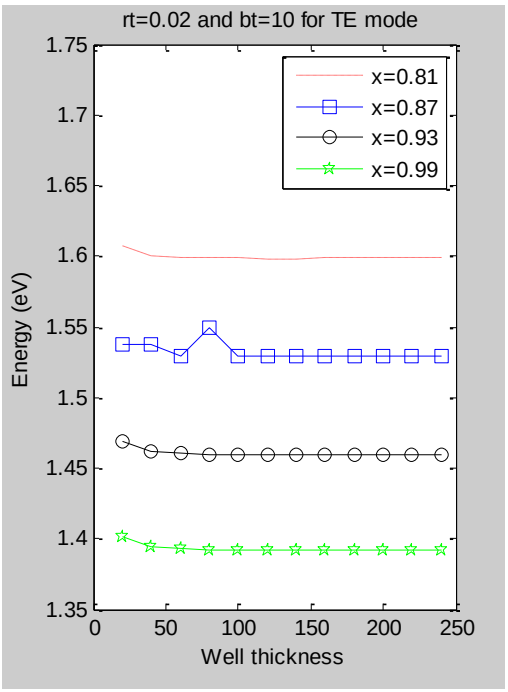


Fig 6(c): Variations of Energy (eV) with respect to well thickness in TE mode.

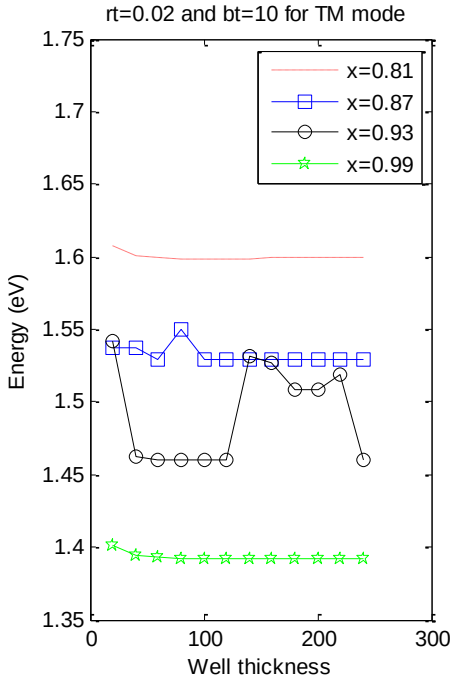


Fig 6(d): Variations of Energy (eV) with respect to well thickness in TE mode.

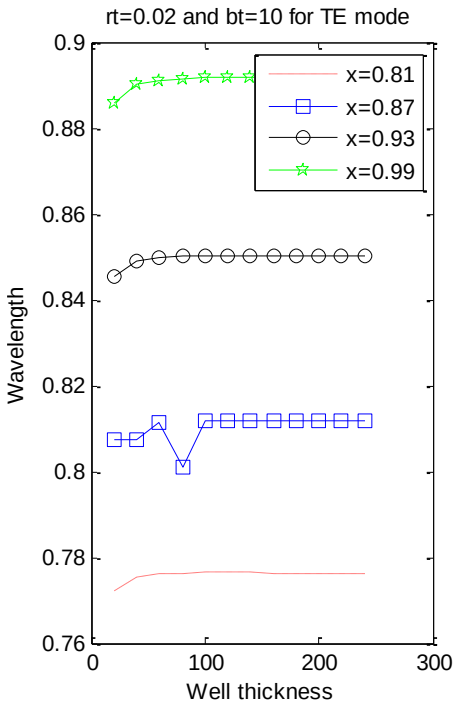


Fig 6(e): Variations of wavelength with respect to well thickness in TE mode.

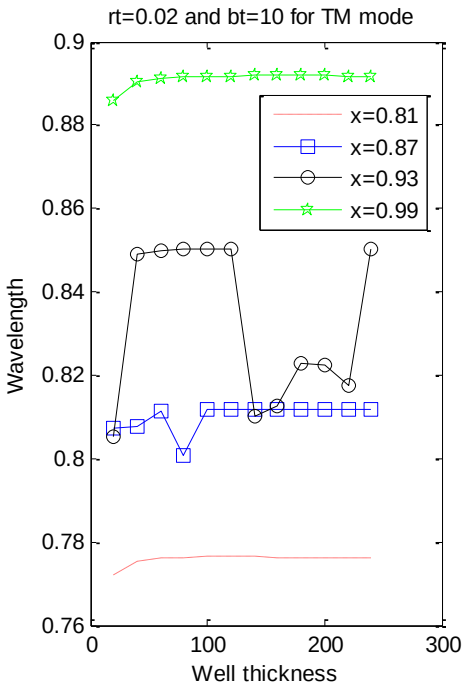


Fig 6(f): Variations of wavelength with respect to well thickness in TM mode.

Fig 7 shows the variations of maximum gain values that are globally obtained at different relaxation time rt for TE and TM mode.

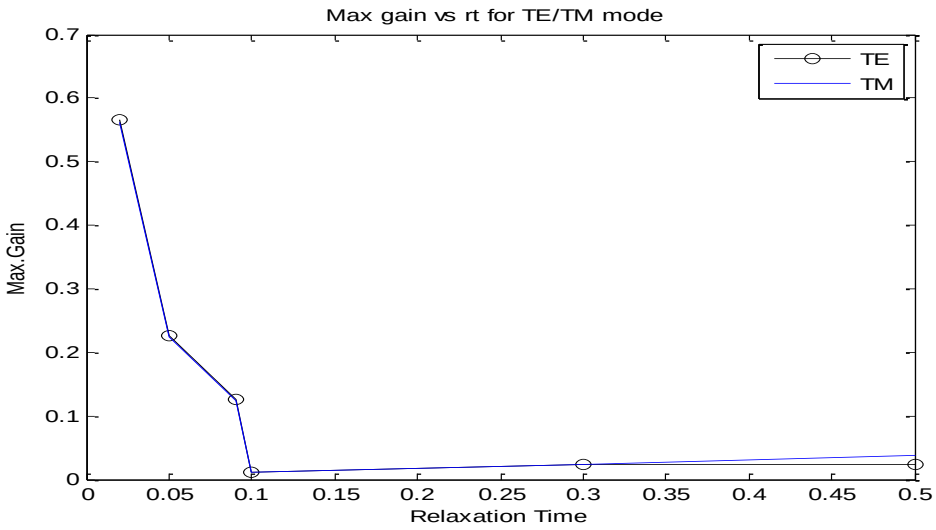


Fig 7: Variation of maximum gain wrt relaxation time(TE/TM).

In this fig we can observed that black line is for maximum gain in TE mode and blue line is for maximum gain in TM mode . Both lines are superimposing each other hence in both TE and TM mode the respective heterostructures are similar and as the rt is increased gain is decreasing and maximum gain is obtained at rt=0.02 and as rt is above than 0.1 maximum gain is nearly constant.

CONCLUSION:

In this work at different parameters we collected maximum gain and wavelength for two different heterostructure configurations. In GaAs/GaAs / and AlGaAs/GaAs. Both heterostructures configurations performance with respect to barrier thickness, well thickness, and relaxation times are separately generated by simulation model to get more maximum gain condition as output parameters. Wavelengths are collected with different composition and best well thickness and barrier thickness are found to analyze the photoluminescence spectra as well as the lasing wavelength of the devices. AlGaAs/GaAs provides maximum gain at barrier thickness of 40 to 55 nm .As the well thickness is increased the gain keeps increasing in TE mode but in TM mode highest gain is achieved at 10nm at lower concentration or at 50nm for higher concentration x. The gain is higher in TM mode for AlGaAs/GaAs as compared to TE mode. Wavelength and energy is independent of change in well and barrier thickness but as the concentration x is increased wavelength decreases and eV is increased. As the relaxation time is increased gain increases in both TE/TM mode but wavelength remains constant with respect to relaxation time. Similar observations are also observed for InGaAs/GaAs.

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