Chapter Five
Conclusion & Recommendation

5.1 Conclusion:

Out of the following thesis completion; the synapses of this study could be outlined as follows:

The synthesis of polymer film detector from Cu_2O/PVA has been synthesized using simple dissolving of PVA in hot water and mixed with Cu_2O, then stretched in petri dishes for film forming under ambient condition. The formed films received gamma radiation doses (0, 1, 2, 4, 6, 8, 10 and 12 Gy). These irradiated films showed color changes gradient from light pink to dark brown; then characterized by UV-visible spectroscopy and optical densitometer. The resultant findings showed that: the color change could be used as personal radiation dosimeter i.e. plotting of permanent graph for the relation of radiation dose versus optical density that could be utilized to read any dose for radiation worker based on pre-determined optical density. The spectroscope shows two prominent peaks at λ = 415 nm and 213 nm. These peaks for absorption coefficient of formed cupric oxide (CuO) and pure PVA for visible light band and ultraviolet band respectively. Also the optical densitometer reveals that: there was a correlation between the dose and the optical density that increases as the radiation dose increase from 0 Gy up to 12 Gy in a proportional, linear and significant ($R^2 = 0.9$) correlation. Such correlation has been fitted to equations: $y = 0.13x + 0.09$ for irradiated PVA/Cu_2O at visible light band and $y = 0.12x - 0.05$ for pure PVA at

ultraviolet light band (*x refers to radiation dose in Gy and y refers to absorption coefficient in au*) i.e. the PVA/Cu_2O film sensitivity to radiation equivalent to absorption of 0.2 (arb. unit) at 1 Gy. The radiation effects also being deduced from UV-visible spectroscope as reduction in the band gap energy from 3×10^{-12} to 2×10^{-12} eV relative to radiation dose from 0 – 12 Gy.

5.2 Recommendation:

The worth points to be recommenced after finishing and achieving the objectives of this study will be the followings:

- Further studies in irradiation of polymer is recommended to show the feasibility of preparing the conducting polymers as well as degradation
- Preparing PVA/Cu_2O with further advanced characteristics to be utilized in radiation detection with variables energies and sensitivities.
- Applying different equipment for further characterization, such as Raman spectroscope, XRD, TEM and SEM.
- Encouraging the applications of polymers in various aspects in man life for their obvious economic and recycling.

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Appendices

The absorption coefficient for PVA\Cu_2O films irradiated with g-radiation doses 0-12 Gy doses. (24 films) at λ =200 and λ =410 nm

Applied dose (In GY)	absorption coefficient (au)			
	1st film	2nd film	3rd film	AVERAGE
0	0.021	0.022	0.022	0.022
1	0.748	0.745	0.746	0.746
2	0.879	0.882	0.885	0.882
4	1	0.998	0.998	0.997
6	1.198	1.201	1.2	1.2
8	1.492	1.494	1.496	1.494
10	1.61	1.611	1.611	1.611
12	1.783	1.784	1.783	1.783

The relevant optical density in (a. u) for PVA\Cu_2O films irradiated with gamma-radiation doses 0-12 Gy doses. (24 films) at λ =200 and λ =410 nm.

Applied dose (InGy)	optical density (au)			
	1st chip	2nd chip	3rd chip	AVARAGE
0	0.018	0.019	0.017	0.018
1	0.175	0.174	0.174	0.174
2	0.193	0.194	0.193	0.193
4	0.222	0.224	0.223	0.223
6	0.265	0.264	0.263	0.264
8	0.312	0.311	0.312	0.312
10	0.347	0.346	0.346	0.346
12	0.388	0.39	0.389	0.389

Reading of TLD irradiated with g-radiation doses 1-12 Gy doses. (24 chips)

A.D(Gy)	TLD read out (In GY)			
	1st chip	2nd chip	3rd chip	AVERAGE
0	0	0	0	0
1	1	0.982	0.993	0.992
2	1.992	2	1.993	1.995
4	3.984	4	3.982	3.989
6	5.99	5.994	6	5.995
8	7.992	8	7.982	7.991
10	9.994	9.991	9.993	9.993
12	12	11.994	11.984	11.993

The relevant optical density in (a. u) for TLD chips irradiated with g-radiation doses 0-12 Gy doses. (24 chips) at λ =200 and λ =410 nm.

A.D (Gy)	optical density (au)			
	1st chip	2nd chip	3rd chip	AVERAGE
0	0	0	0	0
1	0.175	0.174	0.174	0.173
2	0.193	0.194	0.193	0.193
4	0.222	0.224	0.223	0.223
6	0.265	0.264	0.263	0.264
8	0.312	0.311	0.312	0.312
10	0.347	0.346	0.346	0.346
12	0.388	0.39	0.389	0.389