***Chapter Five***

***Conclusions and Future Works***

**5.1 Conclusions**

1. The inferred results from new irradiation technique serviced to accurate determination for distance between detector and alpha emitter source, in addition to control of the incident angle of alpha particle to get of the different energies value instead of used ordinary trestle without straightened rule.

2. New Quality scale (NIQWT) was better than the rest where used to calculate quality factor as well as other well-known standards (Entropy, average gradient, and EMEE). the extraction of correlation coefficients were the best values for preparation of the tracks of automatic count higher than the manual count for nuclear tracks for different levels lightness.

3. The extent of alpha particle track increasing to penetrate inside CR-39 detector when increasing level lightness by three dimensions formalizes.

4. The best correlation coefficients to specify the intensity level for CR-39 detector to detect alpha particles was with best resolution for the tracks. Therefore, increasing of nuclear tracks found was due to the increase in illumination (lightness) in which images are captured. This does not mean the necessarily of increasing image quality. Thus, there are lighting levels that make the image having high quality which is (949) lux.

5. This study shows that there are possible of changing light optical microscope from tungsten source by light emitting diode source to increase the number of track discovered of Alpha particle. The radiation track for the thermal neutrons at a different time was determined before and after the value of maximum and minimum track. Finally comparison results with image processing by using four no reference scales, illustrated results conclusion the LED light increases the number of nuclear tracks.

6. At these processes led to augment visibility and numbering of nuclear tracks discovered.

7. It is clear from the results that the correlation coefficient was high because it corresponds to the manual counting using the source of the light emitting diode instead of the tungsten light of the nuclear tracks of alpha particles on the CR-39 irradiated detector with the Am-241 thermal neutron source to increase the clarity and thus the accuracy of the number of nuclear tracks of alpha particles discovered.

8. This study obtained by image processing and analysis technique in MATLAB programs at scanning time of less than a few minutes per image analyzed, and better option for personnel monitoring where large numbers of samples are to be processed and analyzed. And the determination of nuclear track detector features which calculated in CR-39 detector by using image processing technique.

9. There was another method in MATLAB program from options like (image processing tool box – an enhancement - correlation non-uniform illumination) which using determination of shape, radius, area and depth of tracks depending on the standardization of the tracks in areas selected the maximum values, while previous studies took all values randomly.

10. The relation which calculated from MATLAB program for nuclear tracks can be obtained the amount of energy particles with irradiation times, which used to determine the types of alpha particles.

11. We conclude better etching time increasing with increase applied energy on the CR-39 detector.

12. The rates of the radius of the numbers tracks remain constant with increasing irradiation times.

13. Depth means are vary depending on the time of etching down to its greats value, at optimum etching time for the number of total tracks and for all energies of alpha particles used (0.2, 1, 1.5, 2, 2.5, 3.5, 5) MeV.

14. The increase in the number of tracks is increased by increasing the energy to reach the highest energy value of the used CR-39 detector and then decreases.

15. The inferred results from images processing for nuclear track detectors; it could give a clear picture for the amount of irradiation contamination by alpha emitter’s sources.

**5.2** **Future Works and Recommendations**

1. The data analysis which calculates by MATLAB program for the features of nuclear track detectors. Specialized maximum values of nuclear track detectors can be used in the nanotechnology researches.

2. Image processing analysis methods can be used also for the images which photo by polarized optical microscope or scanning electron microscope.

3. Study properties of tracks with varying incident angle values of alpha particle by using a new irradiation technique.

4. Study features of track to obtain parameters for (CN-85, LR-115, and Lexan) detectors by MATLAB program in image processing technique.

5. A Recognize the overlapping blood cells which are a new concept in microscopy counting. Uncertainly modeling in overlapping track counting is another important subject.