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ARTICLE

Infrastructure of Synchrotronic Biosensor Based on Semiconductor Device Fabrication for Tracking, Monitoring, Imaging, Measuring, Diagnosing and Detecting Cancer Cells

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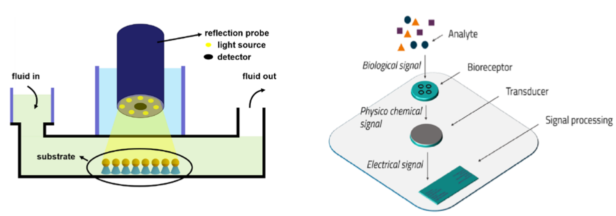
Cancer Cells
Tris(2,2'-bipyridyl) ruthenium(II)(Ru(bpy)32+)

ABSTRACT

Copper Zinc Antimony Sulfide (CZAS) is derived from Copper Antimony Sulfide (CAS), a famatinite class of compound. In the current paper, the first step for using Copper, Zinc, Antimony and Sulfide as materials in manufacturing synchrotronic biosensor-namely increasing the sensitivity of biosensor through creating Copper Zinc Antimony Sulfide, CZAS (Cu1.18Zn0.40Sb1.90S7.2) semiconductor and using it instead of Copper Tin Sulfide, CTS (Cu2SnS3) for tracking, monitoring, imaging, measuring, diagnosing and detecting cancer cells, is evaluated. Further, optimization of tris(2,2'-bipyridyl)ruthenium(II)(Ru(bpy)32+) concentrations and Copper Zinc Antimony Sulfide, CZAS (Cu1.18Zn0.40Sb1.90S7.2) semiconductor as two main and effective materials in the intensity of synchrotron for tracking, monitoring, imaging, measuring, diagnosing and detecting cancer cells are considered so that the highest sensitivity obtains. In this regard, various concentrations of two materials were prepared and photon emission was investigated in the absence of cancer cells. On the other hand, ccancer diagnosis requires the analysis of images and attributes as well as collecting many clinical and mammography variables. In diagnosis of cancer, it is important to determine whether a tumor is benign or malignant. The information about cancer risk prediction along with the type of tumor are crucial for patients and effective medical decision making. An ideal diagnostic system could effectively distinguish between benign and malignant cells; however, such a system has not been created yet. In this study, a model is developed to improve the prediction probability of cancer. It is necessary to have such a prediction model as the survival probability of cancer is high when patients are diagnosed at early stages.



Schematic of infrastructure of synchrotronic biosensor based on semiconductor device fabrication for tracking, monitoring, imaging, measuring, diagnosing and detecting cancer cells

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1. Introduction

Biosensors are systems for tracking, monitoring, imaging, measuring, diagnosing and detecting the concentration of cancer cells such as proteins, enzymes, nuclides and etc. which produce by various methods and materials depending on the type of biosensor and cancer cells. In optical method of synchrotron, a synchrotronic excites at the presence of activator agent due to applying electrical potential and hence, emits photon. in optical synchrotronic biosensor, the concentration of cancer cells can be measured using this method and stabilizing the synchrotron radiation on the cancer cells. In other words, cancer cells play the role of electrical potential carrier to synchrotron radiation. Hence, the applied potential to synchrotron radiation varies with concentration of cancer cells and therefore, the intensity of emitted photons varies [1-47]. The advantages of synchrotron method compared to other optical methods are (a) It does not necessary to have an excitation source which cause to reduction of optical interferences; (b) Having strong time and position separation power; (c) Simplicity, low cost, high speed and low time of measurement [48-92].

In the produced optical biosensor, as the first sample in the country, Copper Zinc Antimony Sulfide, CZAS (Cu1.18Zn0.40Sb1.90S7.2) semiconductor was used which is one of the most used synchrotron radiation, applied in manufacture of synchrotronic biosensors due to its high quantum efficiency and small size. Small size of Copper Zinc Antimony Sulfide, CZAS (Cu1.18Zn0.40Sb1.90S7.2) semiconductor leads to its easy conjugation with cancer cells which minimizes the interference in immune system of cancer cells [93-121]. In the produced optical sensor, Tris(2,2'-bipyridyl)ruthenium(II) (Ru(bpy)32+) is used as activator agent for Copper Zinc Antimony Sulfide, CZAS (Cu1.18Zn0.40Sb1.90S7.2) semiconductor.

One of the basic characteristics of biosensor is its high sensitivity. Sensitivity of a biosensor is the minimum amount of concentration detection of cancer cells. According to this definition, sensitivity of the produced biosensor increases proportional to increase in intensity of emitted photons from synchrotron radiation. Hence, Copper Zinc Antimony Sulfide, CZAS (Cu1.18Zn0.40Sb1.90S7.2) semiconductor was used for this reason.

Copper Zinc Antimony Sulfide, CZAS (Cu1.18Zn0.40Sb1.90S7.2) semiconductor nanoparticles enhance the intensity of photons due to some advantages. Two time-ionized CZAS nanoparticles easily coop Copper Zinc Antimony Sulfide, CZAS (Cu1.18Zn0.40Sb1.90S7.2) semiconductor ions due to having negative charge and enhance the optical stability of Copper Zinc Antimony Sulfide, CZAS (Cu1.18Zn0.40Sb1.90S7.2) semiconductor because of their optical property. At the other hand, as these molecules are of large active surface, they are able to charge (coop) a large amount of Copper Zinc Antimony Sulfide, CZAS (Cu1.18Zn0.40Sb1.90S7.2) semiconductor molecules. However, CZAS nanoparticles cannot individually stabilize on cancer cells such as antibodies and hence, Copper Zinc Antimony Sulfide, CZAS (Cu1.18Zn0.40Sb1.90S7.2) semiconductor nanoparticles are used to solve this problem [122-184].

The produced Copper Zinc Antimony Sulfide, CZAS (Cu1.18Zn0.40Sb1.90S7.2) semiconductor nanoparticles have negative charge on their surfaces due to the manufacture type and therefore, they can easily absorb functional groups with positive charge (such as amino groups). Many cancer cells are of functional groups with positive charge. To settle Copper Zinc Antimony Sulfide, CZAS (Cu1.18Zn0.40Sb1.90S7.2) semiconductor nanoparticles with negative charge on CZAS, layers with positive charge such as amino groups can be used. Due to small size of nanoparticles, a large number of them settle on CZAS (Figure 1). In addition, regarding the fact that Copper Zinc Antimony Sulfide, CZAS (Cu1.18Zn0.40Sb1.90S7.2) semiconductor nanoparticles are strong electric conductors, they enhance electron transferring process (electrical potential) to Copper Zinc Antimony Sulfide, CZAS (Cu1.18Zn0.40Sb1.90S7.2) semiconductor coop into ZCAS [185-217].

In this project we applied several machine learning techniques on the Wisconsin Diagnostic Breast Cancer data set to classify the cancer based on the feature extracted from images as benign or malignant [50-73].

In the current age, pancreatic cancer is one of the worst forms of cancer. The complications of pancreatic include five types of pancreatitis, benign tumors, malignant tumors, benign cysts and malignant cysts [1-27]. This cancer has a few clinical symptoms than other cancers. Also, if not treated in a timely manner, it also causes other organs of the body and the patient chance of survival is greatly reduced. One of the ways to detect this disease is to use CT scan images. But the appearance of pancreatic complications is very different in a similar category, and their tissue is very similar to healthy abdominal tissues [28-49]. For this reason, it's very difficult to identify the range of complications. In this study, the data contained 151CT scan images. These images are divided into five classes of pancreatitis, malignant tumors, benign tumors, malignant cysts, benign cysts and a healthy class. The pancreatic complications are varied and different, if the diagnostic system is based on simple experts; the possibility of

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achieving high detection accuracy is not possible. According to the results of this study, lonely no classification can detect all diseases and combining these methods is the best option. Therefore, in this study we have achieved high accuracy in prediction (690. 69) by combining the perception, convolution and SVM neural networks.

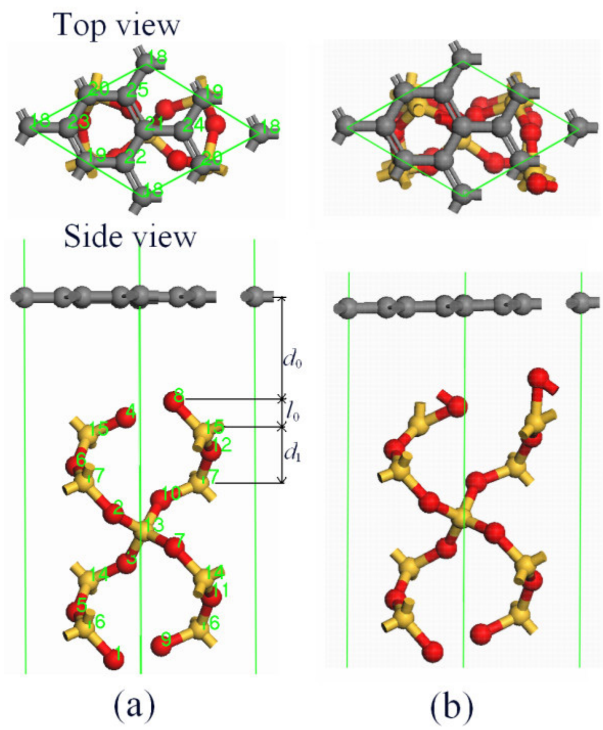

Figure 1. Schematic view of Copper Zinc Antimony Sulfide, CZAS (Cu1.18Zn0.40Sb1.90S7.2) semiconductor

In the current experimental work, in addition to sample preparation and manufacturing sensor device, the effect of semiconductor concentration also is investigated. As it is necessary to prevent any interference on the structure of Copper Zinc Antimony Sulfide, CZAS (Cu1.18Zn0.40Sb1.90S7.2) semiconductor, this issue is investigated in sample preparation and using them in electrochemical system [218-358].

2. Materials, Methods and Techniques

Polyurethane are biocompatible compounds with variety applications in the biomedical fields mostly as drug delivery vehicles. Their various applications are due to their Maneuverable structure with different blocks of diols and isocyanides. In the new presented work, magnetic polyurethane was used as drug carrier which formed of the reaction of Poly-caprolacton and isophoren diisocyanate and finally cyclodextrin as the cross linker. Characterization of the final polymer and certainty of its formation was done through different analytical methods such as FT-IR, TGA, XRD, SEM, TEM and VSM. On the other hand, the percentage of the magnetic nanoparticles in the polymer matrices was tracked using thermal gravimetery analysis. This Nano drug carrier was used for in vitro delivering pharmaceutical agent of doxorubicin. The amount of drug loading and percentage and manner of the drug release were investigated using concentration profile. Cytotoxicity of Nano drug carrier was evaluated using calorimetric method called methylthiazoletetrazolium (MTT) assay on the MCF-7 cell lines and according to the results presented system is very profitable and proper one for delivering Doxorubicin anti-cancer drug [74-93].

Melittin (MEL) is a kind of catalytic peptide that isolated from bee venom. Catalytic peptides are promising drugs for cancer treatment because cancer cells are less likely to develop resistance to a membrane-perturbing agent. However, their nonspecific cytotoxicity has limited their therapeutic applications. In this study, we use citric acid stabilized Fe3O4 magnetic nanoparticles (CA-MNP) as potential magnetic carriers for target delivery of melittin to tumor sites. The morphology and surface functionalization of these magnetic Nano carriers were studied by field emission scanning electron microscopy (FESEM) and Fourier transform infrared. The loading and release profile of MEL were studied by UV spectrophotometry. The results indicate that these magnetic Nano carriers have the high drug loading efficiency and the pH-dependent release behavior. The in vitro cytotoxicity of the MEL-loaded CA-MNP on the MCF-7 breast cancer cell line is similar to that of free MEL in solution at equivalent doses [94-104].

The interest in exploring more effective methods for cancer treatment has increased widely in recent years. In clinical studies it is difficult to determine the temperature distribution in both normal tissue and in tumor during hyperthermia treatment since temperature can be measured in limited number of positions in tissue or tumor. Simulation studies can play crucial role in physician's perception of the temperature distribution in tissue. Hyperthermia treatment is facing some unsolved problems such as the appropriate dosage of magnetic Nano particles required to achieve the optimum temperature which results in apoptosis in tumor cells. In this study, a 2D computational model is created in COMSOL Metaphysics in order to analyze temperature distribution in both normal tissue and tumor during hyperthermia treatment using various dosages of magnetic Nano particles. Temperature distribution is achieved by considering various layers from wave source through to the tumor and also by taking into account the amount of heat generated through the Brownian rotation and the Neel relaxation. Simulations of a spherical tumor located in ellipse tissue were designed. A systematical

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variation in dosage has been performed. Temperature distribution and maximum temperature in steady state and effect of the dosage of Nano particles [105-117].

In this study, cobalt Ferrite nanoparticles with inverse spinel structures were obtained using co-precipitation of cobalt and iron nitrates. Ammonia 15% was used as an alkaline agent for pH adjustment. Besides, we used oleic acid to coat the cobalt ferrite nanoparticles. XRD analysis showed that the samples included spinel ferrite structure. According to the results of SEM the distribution of the particles was homogeneous and the particles were uniform, and pseudo-spherical in shape. The magnetic properties of the material were analyzed by the VSM that showed the relationship between super-paramagnetic properties of the material and particle size. In this research, for the first time, anti-cancer effects of cobalt ferrite nanoparticles on K562 cell line as an experimental model of acute myeloid leukemia (CML) were examined. Because this compound has the potential to induce differentiation and apoptosis, it can be used in conjunction with other pharmaceutical compounds as a promising candidate for the treatment of blood cancer patients [118-143].

Cancer, as a leading contributor to the global disease burden is characterized by the uncontrolled growth of cells in the body, which makes it one of the most difficult and complex diseases to treat. Dietary sources of natural products including fruits and vegetables have been reported to be associated with reduced risk of a variety of tumors and to have anti-cancer benefits, apart from being a good source of nutrients. Thus, among major groups of anti-cancer drugs, plant extracts have received considerable attention to discover promising cancer therapeutic agents from natural sources. Great interest is currently centered on the biologic activities of quercetin a polyphenol belonging to the class of flavonoids, natural products well known for their beneficial effects on health, long before their biochemical characterization. onion skin waste is rich in bioactive compounds such as phenolic and flavonoids. In this direction, Quercetin, a natural compound abundantly present in Onion skin has great therapeutic potential in the prevention and treatment of cancer. This review focuses on anti-cancer potential of Quercetin with current advancements for its implementation in treatment of cancers [144-173].

Breast cancer is the uncontrolled growth of abnormal cells in the breast area and it is one of the widespread causes of mortality in today's world. So that 8000 people are diagnosed with breast cancer of a year in the world. The exact and precise diagnosis is considered as the vital point in the process of treatment. Among the various methods of screening, thermography is a non-invasive and safe method to detect breast cancer. In this work, a classification algorithm of thermograms with the purpose of detection of breast cancer from gray level co-occurrence matrix based features texture has been proposed. For this purpose, 52 images from the breast of healthy and unhealthy people from the data were collected. The preprocessing and segmentation of data was performed in gray level for the creation of temperature matrix. Finally, the gray level co-occurrence matrix based features was extracted from the matrix and the collection of features using Manhattan technique was the input for weighted K-nearest neighbor classifier. The result of Accuracy was 85.6, Sensitivity was 91.7 and Specificity Index was 81.2 selected as the optimal structure compared to other methods that have been proposed so far [190-203].

Cancer is the third leading cause of death in the world, as well as breast cancer is the second most common cause of death among women in the world. According to calculations by the National Cancer Institute of the United States, one person of every eight women will be diagnosed with breast cancer. Unfortunately, the age of cancer in the world is a decade younger than other developed countries. Therefore, early diagnosis of this disease is essential in the healing process. With detect and remove cancerous tumors in the early stages before spreading to neighboring areas, cancer threats be stopped. Among the various methods of screening, thermography is a non-invasive and safe method to detect breast cancer. In research, at first paid to the automatically way that in this regard, Kenny edge and Hough transform have been enjoying and then a thermography classification algorithm to detect breast cancer based on certain characteristics extraction of the tissue in gray level co-occurrence matrix is provided. For this purpose, 68 healthy and unhealthy images of the breast are collected from the database. Finally, the features set as input are given into the support vector machine classifier. The result of Accuracy was 87.3, Sensitivity was 89.6 and Specificity Index was 83.9 selected as the optimal structure compared to other methods that have been proposed so far [204-224].

Cancer caused by cells goes out of correct pathways. This cell can invade to surrounding healthy cells. There are over 100 different types of cancer and all of them classified by the type of cell that affected. Usually malignancy of gastric cancer starting from layer of the stomach. Gastric cancer has been mentioned as a third cause of death in the world. According to the statistical results, we can see the high frequency of gastric cancer in, Japan, China, Central and South America, Eastern Europe and parts of the middle east. Higher rates usually have been seen group with lower socioeconomic [225-241]. Some signs of this

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cancer are indigestion or heartburn, vomiting, diarrhea, constipation and having blood in stool. Stomach cancer usually detects in early stage. Each factor that increase the chance of developing cancer is known as a risk factor. Some factors that may increase the risk of stomach cancer are: Age, gender, bacteria, family history, race, diet, previous surgery, smoke and obesity [242-266]. Diagnosis of gastric cancer at first are obtained from laboratory tests and biopsy of stomach with endoscopy. In the next step, cancer may be treated with Surgery, radiation therapy, chemotherapy or immunotherapy [267-284].

Lung cancer is one of the deadliest cancers, such that it causes more deaths compared to breast cancer, colon cancer and prostate cancer and it is mainly because it cannot be diagnosed at early stages due to shortage of symptoms, such that survival rate of patients for 5 years after surgery is only 14%; while diagnosing the disease at early stages increases this probability to 70%. Increasing growth of this disease, difficulty of its diagnosis from images and importance of diagnosis at early stages requires CAD methods with high accuracy. In order to realize this important, a novel algorithm is proposed in this study which selects features online using genetic algorithm and statistical functions. Our purpose is to separate effective features among available features. In order to classify data, a series of data called feature is required for which disease features are used. In many datasets, some features do not affect decisions and they are additional. So selecting an appropriate subset of inputs can be effective in classification accuracy and its speed. For this purpose, genetic algorithm with an objective function based on data sparsity and statistical concepts. The proposed method is implemented and results indicate high accuracy of this algorithm in selecting effective features and increasing accuracy of the classifier compared to basic methods and other studies [285-299].

Cancer is a major cause of death with more than 10 million annual patients. It is possible that this number reaches 15 million patients per year by 2020. Though chemotherapy has largely been successful in controlling and treating cancer, live tissue damage, systemic toxicity and side effects in this method are among the issues that cannot be overlooked. In order to reduce the negative effects of anticancer drugs on normal tissues, we need to design Nano-sized carriers that can pass the safety barriers and body tissues and reach their target site. In this work, the size and zeta potential of Nano-carriers PLGA-Cs-Paclitaxel were evaluated. Chitosan connection in physical or conjugated forms may lead to a significant increase of polydispersity. According to the study carried out on the concentration of Chitosan and the type of absorption, it was concluded that nanoparticles size increases with higher concentrations of Chitosan. The zeta potential will increase, provided the conjugation of Chitosan is higher than physical adsorption [300-311].

Cancer stem cells (CSCs) are rare sub-population of tumor with ability to differentiate and self-renew. Some properties of CSCs such as increased ability to repair damaged DNA/RNA, as well as increased expression of transporters responsible for drug efflux make them main agents for resistance to chemotherapy. In colon cancer, FOLFOX is a common therapy. In this study, we have analyzed the effects of FOLFOX on CSCs population of colon cancer cell line. Results show that in addition to a dose-dependent reduction in cell viability, FOLFOX caused a decrease in SP cells relative to untreated controls [344-358].

For the detection of DNA/RNA hybridization, a new electrochemical biosensor was developed on the basis of the interaction of Doxirubicine (DOX) with 22-mer oligonucleotides (from human cancer) a simple bio sensing design to yield an ultrasensitive electrochemical biosensor for cancer biomarker detection on Screen Printed Gold Electrodes (SPGE) without use of any modification on electrode surface perhaps direct detection with the help of electroactive label (DOX) and MicroRNA92a (miRNA) as an biomarker selected for being up-regulated in cancer. The biosensor was assembled in two stages the immobilization of the probe that was modified on an SPGE and second stage of target hybridization of completely match strand electroactive label DOX has been used after hybridization process which is an intercalator with our miRNA strands as a redox indicator for amplifying the electrochemical signal of miRNA 92a. For conformation electrochemical techniques including Cyclic Voltammetry (CV) and Differential Pulse Voltammetry (DPV). were used and hybridization was observed successfully. The final biosensor provided a sensitive detection of miRNA 92a with good selectivity.

Based on the researches, one of the most common cancer among the men is malignant cancer. Which seen after surgery and gland removing completely the amount of PSA in patient increases again and available drugs which have severe side effects cannot effect on rising the PSA. One parameter that without it cancer cells are not able to reproduce is Glutamine Amino Acid. With studying humanity biochemical pathway and Glutamine Amino Acid reabsorbing pathways by cancer cells we understand that two material Ursolic Acid and Resveratrol could dock with a lots of Allosteric Enzymes inside the reabsorbing pathway Glutamine Amino Acid by cancer cells. That inactive enzymes therefore more than 90 % reabsorbing pathways Glutamine Amino Acid will be closed. Docking these two materials Ursolic Acid and Resveratrol with Allosteric enzymes reabsorbing pathways Glutamine Amino Acid by cancer cells and inactivating enzymes with software Autodock-vina and QSAR has been checked. Also Curcumin could stimulate Apoptosis in cancer cells. Since three above substances (Resveratrol, Curcumin, Ursolic acid) exist in available compounds like skin of red apple, turmeric and black grapes, men above forty years old can reduce risk of cancer by combining a big apple with some turmeric and black grapes (as a potion or juice). So it can protect from cancer. After prostate surgery, PSA may raise again. Consumption of this potion in these cases can replace current medications with several adverse effects. Since we could find Ursolic Acid in red apple skin and Resveratrol in black grape and Curcumin in Turmeric, we could extraction and combine these three material and with determining the amount of doze make a medicine. Then doing the next steps like animal test, toxic test and human test. Base on human gene plan (HGP) and humanity biochemical pathway lack of Allosteric enzymes which by two material Ursolic Acid and Resveratrol will be inactivate and therefore non-proliferation cancer cells.

Chemotherapy resistance of cancers have become a big challenge in modern medicine. Recently, in order to overcome the drug resistance issue, producing novel drug which used with previous ones as multidrug treatment became an alternative. One of the compounds that have drawn much attention in this regard is chromenes. Chromenes have a heterocyclic structure with gamma benzopyrone, and anti-cancer activities. Studies tried to produce new derivative of chromenes which have better effect on cancer therapy. In this investigation we produced four novel derivatives of chromenes and studied the effect of these compounds on the human acute lymphoblastic leukemia cell line ofMOLT4. A series of novel 4-hydroxycoumarinhas been synthesized via multi-step protocol. The structure of the new compound was established using spectroscopic method (H-NMR, C-NMR). MOLT4cells were cultured in RPMI medium with 10% fetal bovine serum. The cytotoxic effect of different concentrations (0, 50, 250, 500 and 1000 nM) of novel synthetic compounds were evaluated by the MTT assay and cell counting after different incubation times (24, 48, 72 h). These compounds decreased viability of the MOLT4 cells in a time- and dose-dependent manner. Notably, meaningful differences were found between all concentrations and control groups. However, C2 had fewer IC50 in comparison to other ones. Interestingly, this derivative showed significantly cell toxicity at the concentration of Nano-Molar, while previously reported ones have cell toxicity at micro-Molar concentrations. Dihydrochromeno (3, 4-b) chromenes have anti-neoplastic effects on MOLT4 by inducing of apoptosis. Further studies are needed to find exact mechanisms of its effect.

3. Results and Discussion

In order to recognize the size of produced Copper Zinc Antimony Sulfide, CZAS (Cu1.18Zn0.40Sb1.90S7.2) semiconductor nanoparticles, SEM imaging was used. Figure (2) shows a sample of SEM image produced from Copper Zinc Antimony Sulfide, CZAS (Cu1.18Zn0.40Sb1.90S7.2) semiconductor nanoparticles. In this regard, the average size of these particles is between 15-20 (nm).

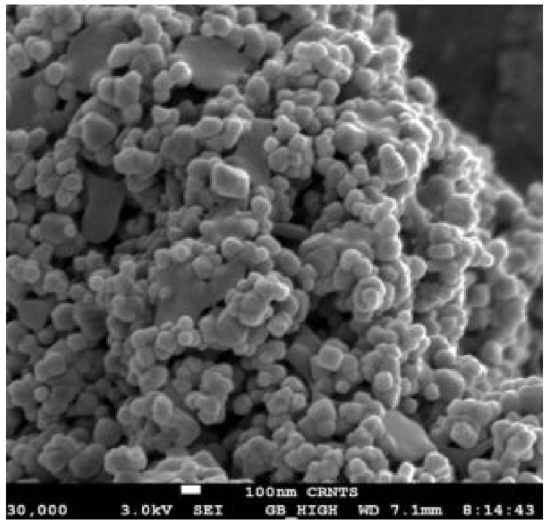

Figure 2. SEM image for the produced Copper Zinc Antimony Sulfide, CZAS (Cu1.18Zn0.40Sb1.90S7.2) semiconductor nanoparticles

Figures 3a and 3b show SEM images for Cu-Zn and Cu-Zn-Sb, respectively. Size of these nanoparticles is about 50 (nm). By comparing the obtained sizes, it was indicated that Cu-Zn nanoparticles are able to load a large number of Cu-Zn-Sb nanoparticles.

Figure 4 shows attenuated total reflectance-Fourier transform infrared (ATR-FTIR) spectra of Cu, Cu-Zn and Cu-Zn-Sb semiconductor. Comparison of absorptive curves indicate 5 (nm) shift of wavelength in the spectrum of Cu-Zn at 450 (nm) which confirms cooping of Copper Zinc Antimony Sulfide, CZAS (Cu1.18Zn0.40Sb1.90S7.2) semiconductor into Cu-Zn-Sb. In addition, according to emission curve, semiconductor manufacture does not change the emitted spectrum of Cu and its synchrotron nature and increasing the emission intensity of semiconductor indicates copping a large number of Copper Zinc Antimony Sulfide, CZAS (Cu1.18Zn0.40Sb1.90S7.2) semiconductor molecules.

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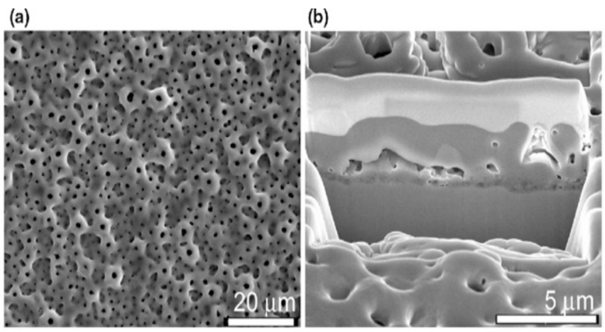

Figure 3. SEM images for (a) Cu-Zn and (b) Cu-Zn-Sb, respectively

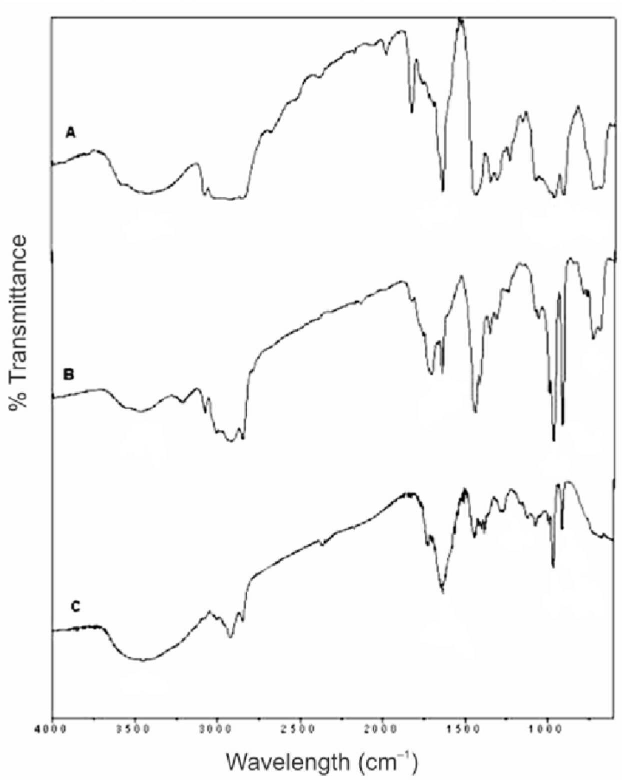

Figure 4. Comparative attenuated total reflectance-Fourier transform infrared (ATR-FTIR) spectra for (a) Cu, (b) Cu-Zn and (c) Cu-Zn-Sb (photo shows vibrational spectra for (a) Cu, (b) Cu-Zn and (c) Cu-Zn-Sb)

As ray emitted from samples is used to affect cancer cells, its amount was measured through selecting optimum concentration of semiconductor on the produced samples and concentration of required Tris(2,2'-bipyridyl)ruthenium(II) (Ru(bpy)32+) solvent before applying synchrotron on cancer cells. In this regard, the intensity of synchrotron of samples in solvents with various concentrations were measured to find optimum concentration of semiconductor in the produced samples for a constant concentration of solvent, as shown in Figure (5). From this test, optimum amount of Copper Zinc Antimony Sulfide, CZAS (Cu1.18Zn0.40Sb1.90S7.2) semiconductor semiconductor was determined as 2 (mg/ml) and then, samples with optimum concentration of semiconductor were tested at different concentrations of Tris(2,2'-bipyridyl)ruthenium(II) (Ru(bpy)32+) solvent and again, optimum synchrotron was obtained as 20 (mM). Figure (6) indicates this optimum amount.

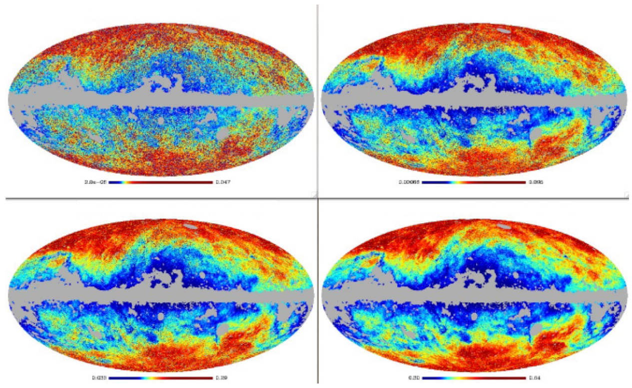

Figure 5. Photon emission for various concentrations of semiconductor (Figure: Optimization graphs of concentration of Copper Zinc Antimony Sulfide, CZAS (Cu1.18Zn0.40Sb1.90S7.2) semiconductor semiconductor)

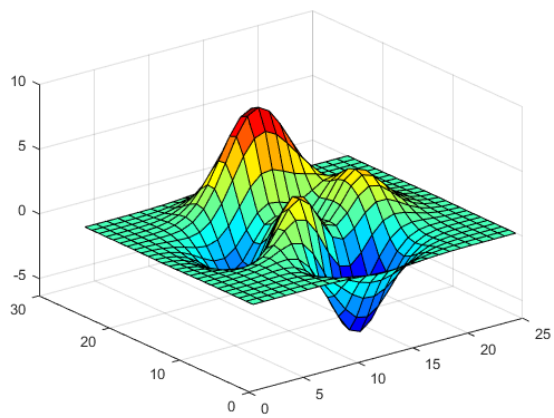

Figure 6. Photon emission for various concentrations of Tris(2,2'-bipyridyl)ruthenium(II) (Ru(bpy)32+) (Figure: Optimization graph of concentration of Tris(2,2'-bipyridyl)ruthenium(II) (Ru(bpy)32+))

4. Conclusions, Summary, Perspectives, Useful Suggestions and Future Studies

As the manufacture of synchrotronic biosensor is performed for the first time in the country, it was necessary to provide appropriate conditions such as high sensitivity and optimizing the effective factors in tracking, monitoring, imaging, measuring, diagnosing and detecting cancer

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cells before any measurement. Lack of these conditions will lead to loss of cancer cells. Cancer is a major cause of death with more than 10 million annual patients. It is possible that this number reaches 15 million patients per year by 2020. Though chemotherapy has largely been successful in controlling and treating cancer, live tissue damage, systemic toxicity and side effects in this method are among the issues that cannot be overlooked. In order to reduce the negative effects of anticancer drugs on normal tissues, we need to design Nano-sized carriers that can pass the safety barriers and body tissues and reach their target site. In this research, the size and zeta potential of Nano-carriers PLGA-Cs-Paclitaxel were evaluated. Chitosan connection in physical or conjugated forms may lead to a significant increase of polydispersity. According to the study carried out on the concentration of Chitosan and the type of absorption, it was concluded that nanoparticles size increases with higher concentrations of Chitosan. The zeta potential will increase, provided the conjugation of Chitosan is higher than physical adsorption.

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