تقرير

مشاركة قسم الفيزياء

في مسابقة مشاريع التخرج

شـــارك قســـم الفيزياء في المســـابقة التي أقامها معهد الابـداع وريـادة الاعمـال الخـاصـــة بـالملصـــقـات البحثيـة (البوسترات) لمشاريع التخرج بثلاثة عشر بوستر . وقد حصلت طالبات مشروع التخرج بعنوان

(Green Synthesis, Characterization and Anticancer Activity of Copper Oxide Nanoparticles)

علي جائزة المركز الأول كأفضـل بوسـتر مشـروع تخرج تحت اشـراف سـعادة الدكتورة حنان عامر أسـتاذ الفيزياء الطبية المساعد، كما حصلت طالبات مشروع التخرج بعنوان

(Comparing Between Conventional X-Ray and Fluoroscopy to Assess A Lead Apron)

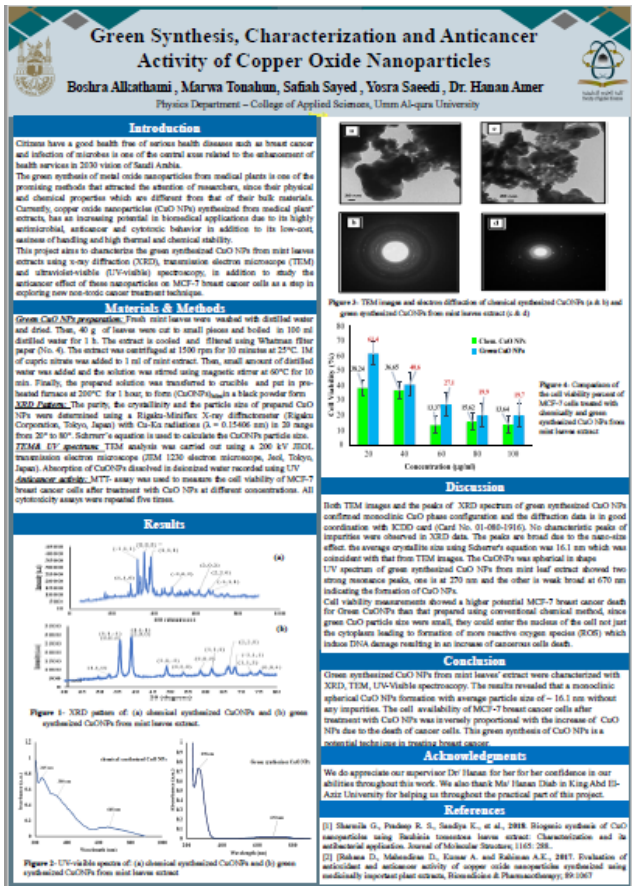
علي جائزة المركز الثالث كأفضل بوستر مشروع تخرج تحت اشراف سعادة الدكتورة أميمة باوزير أستاذ الفيزياء الطبية المساعد

كما حصلت كلية العلوم علي جائزة أفضل كلية فعالة لمشاريع التخرج

شهادة شكر وتقدير

تتقدم إدارة معهد الإبداع وريادة الأعمال بجامعة أم القرى
بخالص الشكر والتقدير
على دوركم الفعّال والمميز في إنجاح الحفل الختامي
لمسابقة مشاريع التخرج لعام ٢٠١٩م

عميد معهد الإبداع وريادة الأعمال
د. مُوفق بن محمد عرجة



Green Synthesis, Characterization and Anticancer Activity of Copper Oxide Nanoparticles

Boshra Alkathami , Marwa Tonahun, Safiah Sayed , Yosra Saeedi , Dr. Hanan Amer

Physics Department – College of Applied Sciences, Umm Al-qura University

Introduction

Citrinus have a good health free of serious health diseases such as breast cancer and infection of microbes is one of the central areas related to the enhancement of health services in 2030 vision of Saudi Arabia.
The green synthesis of metal oxide nanoparticles from medical plants is one of the promising methods that attracted the attention of researchers, since their physical and chemical properties which are different from that of their bulk materials. Currently, copper oxide nanoparticles (CuO NPs) synthesized from medical plant' extracts, has an increasing potential in biomedical applications due to its highly antimicrobial, anticancer and cytotoxic behavior in addition to its low-cost, easiness of handling and high thermal and chemical stability.
This project aims to characterize the green synthesized CuO NPs from mint leaves extracts using x-ray diffraction (XRD), transmission electron microscope (TEM) and ultraviolet-visible (UV-visible) spectroscopy, in addition to study the anticancer effect of these nanoparticles on MCF-7 breast cancer cells as a step in exploring new non-toxic cancer treatment technique.

Materials & Methods

Green CuO NPs preparation: Fresh mint leaves were washed with distilled water and dried. Then, 40 g of leaves were cut to small pieces and boiled in 100 ml distilled water for 1 h. The extract is cooled and filtered using Whatman filter paper (No. 4). The extract was centrifuged at 1500 rpm for 10 minutes at 25°C. 1M of cupric nitrate was added to 1 ml of mint extract. Then, small amount of distilled water was added and the solution was stirred using magnetic stirrer at 60°C for 10 min. Finally, the prepared solution was transferred to crucible and put in pre-heated furnace at 200°C for 1 hour, to form ($CuONPs_{Green}$)a a black powder form.
XRD Pattern: The purity, the crystallinity and the particle size of prepared CuO NPs were determined using a Rigaku-Miniflex X-ray diffractometer (Rigaku Corporation, Tokyo, Japan) with Cu-Kα radiations (λ = 0.15406 nm) in 2θ range from 20° to 80°. Scherrer's equation is used to calculate the CuONPs particle size.
TEM& EV spectrum: TEM analysis was carried out using a 200 kV JEOL transmission electron microscope (JEM 1230 electron microscope, Jeol, Tokyo, Japan). Absorption of CuONPs dissolved in deionized water recorded using UV
Anticancer activity: MTT- assay was used to measure the cell viability of MCF-7 breast cancer cells after treatment with CuO NPs at different concentrations. All cytotoxicity assays were repeated five times.

Results

Figure 1- XRD pattern of: (a) chemical synthesized CuONPs and (b) green synthesized CuONPs from mint leaves extract.

Figure 2- UV-visible spectra of: (a) chemical synthesized CuONPs and (b) green synthesized CuONPs from mint leaves extract

Figure 3- TEM image and electron diffraction of chemical synthesized CuONPs (a & b) and green synthesized CuONPs from mint leaves extract (c & d)

Figure 4- Comparison of the cell viability percent of MCF-7 cells treated with chemically and green synthesized CuO NPs from mint leaves extract

Discussion

Both TEM images and the peaks of XRD spectrum of green synthesized CuO NPs confirmed monoclinic CuO phase configuration and the diffraction data is in good coordination with ICDD card (Card No. 01-080-1916). No characteristic peaks of impurities were observed in XRD data. The peaks are broad due to the nano-size effect. the average crystallite size using Scherrer's equation was 16.1 nm which was coincident with that from TEM images. The CuONPs was spherical in shape
UV spectrum of green synthesized CuO NPs from mint leaf extract showed two strong resonance peaks, one is at 270 nm and the other is weak broad at 670 nm indicating the formation of CuO NPs.
Cell viability measurements showed a higher potential MCF-7 breast cancer death for Green CuONPs than that prepared using conventional chemical method, since green CuO particls size were small, they could enter the nucleus of the cell not just the cytoplasm leading to formation of more reactive oxygen species (ROS) which induce DNA damage resulting in an increase of cancerous cells death.

Conclusion

Green synthesized CuO NPs from mint leaves' extract were characterized with XRD, TEM, UV-Visible spectroscopy. The results revealed that a monoclinic spherical CuO NPs formation with average particle size of ~ 16.1 nm without any impurities. The cell availability of MCF-7 breast cancer cells after treatment with CuO NPs was inversely proportional with the increase of CuO NPs due to the death of cancer cells. This green synthesis of CuO NPs is a potential technique in treating breast cancer.

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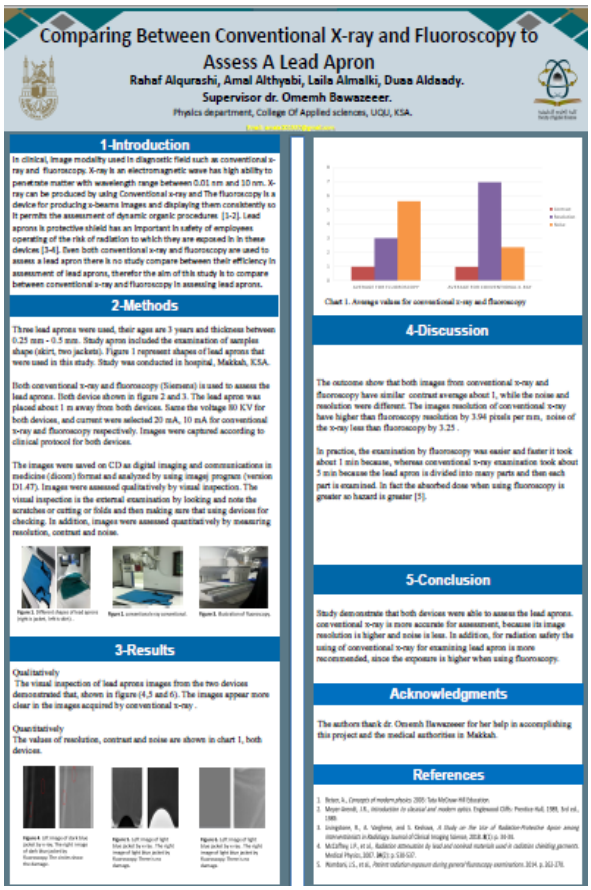

Comparing Between Conventional X-ray and Fluoroscopy to Assess A Lead Apron

Rahaf Alqurashi, Amal Althyabi, Laila Almalki, Duaa Aldasdy.
Supervisor dr. Omemh Bawazeeer.
Physics department, College Of Applied sciences, UQU, KSA.

1-Introduction

In clinical, image modality used in diagnostic field such as conventional x-ray and fluoroscopy. X-ray is an electromagnetic wave has high ability to penetrate matter with wavelength range between 0.01 nm and 10 nm. X-ray can be produced by using Conventional x-ray and The fluoroscopy is a device for producing a-beams images and displaying them consistently so it permits the assessment of dynamic organic procedures. [1-2]. Lead aprons is protective shield has an important in safety of employees operating of the risk of radiation to which they are exposed in in these devices [3-4]. Even both conventional x-ray and fluoroscopy are used to assess a lead apron there is no study compare between their efficiency in assessment of lead aprons, therefor the aim of thh study is to compare between conventional x-ray and fluoroscopy in assessing lead aprons.

2-Methods

Three lead aprons were used, their ages are 3 years and thickness between 0.25 mm - 0.5 mm. Study apron included the examination of samples shape (skirt, two jackets). Figure 1 represent shapes of lead aprons that were used in this study. Study was conducted in hospital, Makkah, KSA.

Both conventional x-ray and fluoroscopy (Siemens) is used to assess the lead aprons. Both device shown in figure 2 and 3. The lead apron was placed about 1 m away from both devices. Same the voltage 80 KV for both devices, and current were selected 20 mA, 10 mA for conventional x-ray and fluoroscopy respectively. Images were captured according to clinical protocol for both devices.

The images were saved on CD as digital imaging and communications in medicine (dicom) format and analyzed by using imagej program (version D1.47). Images were assessed qualitatively by visual inspection. The visual inspection is the external examination by looking and note the scratches or cutting or folds and then making sure that using devices for checking. In addition, images were assessed quantitatively by measuring resolution, contrast and noise.

3-Results

Qualitatively
The visual inspection of lead aprons images from the two devices demonstrated that, shown in figure (4,5 and 6). The images appear more clear in the images acquired by conventional x-ray .

Quantitatively
The values of resolution, contrast and noise are shown in chart 1, both devices.

Chart 1. Average values for conventional x-ray and fluoroscopy

4-Discussion

The outcome show that both images from conventional x-ray and fluoroscopy have similar contrast average about 1, while the noise and resolution were different. The images resolution of conventional x-ray have higher than fluoroscopy resolution by 3.94 pixels per mm, noise of the x-ray less than fluoroscopy by 3.25 .

In practice, the examination by fluoroscopy was easier and faster it took about 1 min because, whereas conventional x-ray examination took about 5 min because the lead apron is divided into many parts and then each part is examined. In fact the absorbed dose when using fluoroscopy is greater so hazard is greater [5].

5-Conclusion

Study demonstrate that both devices were able to assess the lead aprons. conventional x-ray is more accurate for assessment, because its image resolution is higher and noise is less. In addition, for radiation safety the using of conventional x-ray for examining lead apron is more recommended, since the exposure is higher when using fluoroscopy.

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