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PROCEEDING

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1	ISCLS2021 LA001	Design and Manufacturing of magnetic switch using oil and water based ferrofluid and conductive polymers coated with gold and silver nanoparticles	Hiba foud Tawfeeq, Hashim Ali Yusr, Sudad Salman Al- Bassam	University of Wasit, College of Science, Physics Department, and University of Baghdad, College of Science, Physics Department, Iraq
2	ISCLS2021 LA002	Laser-Induced Fluorescence for Imaging Cancer Cells	Nagam T. Ali, Thanaa H. Abd, Haider M. Matrood and Amany A. Awaad	Center of Laser and Optoelectronic, Directorate of Materials Research, Ministry of Science and Technology, Iraq
3	ISCLS2021 LA003	Acescars Treatment using ER:YAG Laser at Wavelength 290nm	Hanaa H. Kadhem, Ali K. Mohsin and Murtadha H. Raheem	Sumer University, University of Wasit and University of Kufa, Iraq
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5	ISCLS2021 LA005	Influence of Pulse duration and water/air cooling ratio on efficiency of Er:YAG laser in debonding of porcelain laminate veneers (in vitro study)	Omar Hamadah and Mohand ALBalkhi	Oral Medicine Department, Higher Institute for Laser Application and Research, Damascus University, Damascus, Syria,
6	ISCLS2021 LA006	IOT by using raspberry pi for vital signs monitoring	Hanan M. Adnan and Ziad T. Al-dahan	Biomedical engineering/Al- Nahrain University, Iraq
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8	ISCLS2021 LA009	Aqreat Scribing Shapes by Galvanometric Scanners in Laser Machining Applications	Ayad A. Dhaydgham and Rawa K. Ibrahim	Ministry of Science and Technology, Advanced Materials Directorate, Laser and Electro-optic Center,Iraq

2. Optics and Fiber Optics ISCLS2021-OFO

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1	ISCLS2021 OFO001	Single Board Computer (ESP-32) Based Heart Diseases Detection	Sara M. Alwan and Ziad T. Al-dahan	Biomedical Engineering Department, AlNahrain University, Baghdad, Iraq
2	ISCLS2021 OFO003	Synthesis High-Performance Beam Splitter (PBS) Based on Mixed Dielectric Material	Rand H. Ali, Alaa Nazar and Kadhim A. Wahed Aadim	Department of Physics, College of Science for Women, University of Baghdad Department of Physics, College of Science, University of Baghdad Iraq
3	ISCLS2021 OFO004	Study the Effect of Harmful Radiation on Patients, Eyes from 15-25 Years during using Smart Devices.	Mundher S. Zina T. Ali	College of Health & Medical Technology Middle Technical University (MTU) Iraq
4	ISCLS2021 OFO005	Comparing and Analyzing Propagation of 1064 nm and 532 nm Wavelengths Laser Beams under Dusty Weather Circumstances for Optical Communication in Baghdad City.	Hisham A. Maliek, and Sawsan K. Fandi	Ministry of Science and Technology, Directorate of Materials Applications Iraq
5	ISCLS2021 OFO006	Role of Mathematical Enhanced Performance of Infrared carbon dioxide gas sensor by using a U-shaped optical cavity	Mohanad M. Azzawi , Rawa K. Ibrahim, Hassan A. Mahdi	Laser and Electro-optic Research Center, Ministry of Science and Technology, Iraq

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2	ISCLS2021 MLT002	Implementation Study Z-Scan Technique to Measure D-Vitamin in Human Body	Bushra R. Madi, Nahla A. Al-Jabar, Ali K. Bake, Eman H. Abass, Dunia A. Al-Fatah, Dafer A. Daher and Noran Adnan	Ministry of Science and Technology, Directorate of Materials Research, Center of Laser and Optoelectronics. Ministry of Science and Technology, Directorate of Materials Research, Pharmaceutical Tools. Iraq
3	ISCLS2021 MLT003	Effect of Laser Exposure on Fatigue Behavior for Epoxy Composites Reinforcement with Glass Fiber	Mohammed Genanu, Nawres Ali and Dhmer Mutlk	Al-Nsour College University, Baghdad, Iraq Binghamton University, NewYork, USA
4	ISCLS2021 MLT004	Role of Mathematical Modelling for Cardiac Function Evaluation in Heart Failure Patients	Mais O. Al-Saffar, Ziad T. Al – Dahhan and Rafid B. Al – taweel	Al-Nahrain University / College of Engineering / Biomedical Engineering Department Iraq

4. Laser-Materials Interaction ISCLS2021-LMI

	Code	Title of Manuscript	Authors	Affiliation
1	ISCLS2021 LMI002	Study the effect of gamma radiation on the self-induced pattern and Gaussian beam profile of pyronin G dye	Mohammed T. Obeed, Hussain A. Badran and Riyadh Ch. Abul-Hail	Basrah University, Polymer Research Center, Department of Material Science Basrah University, Education College for Pure Sciences, Physics Department, Basrah, Iraq
2	ISCLS2021 LMI003	Plasma parameters calculation for Iron ion in metal alloy via laser induced breakdown spectroscopy	Alaa H. Ali, Radhi M. Chyad and Ahmed A. Hamed	Ministry of Science and Technology / Materials research department / Laser and Opto-electronics research center Iraq
3	ISCLS2021 LMI004	An Analysis Study of Si Emission Lines in Heavy Hosting Metal Alloy that Induced via Laser Breakdown Spectroscopy System.	Duaa J. Lafta, Sahib N. AbdulWahab and Alaa H. Ali	Department of Physics, College of Education for Girls, University of Kufa, Najaf, Iraq Ministry of Science and Technology, Materials Department Director, Baghdad, Iraq
4	ISCLS2021 LMI005	Effect of Particle Size on Structural Properties of Ti-6Al-4V Alloy Treated by Laser Technique	Hassan I. Dambos and Hassan J. Abd	Ministry of Science and Technology, Directorate of Nuclear Applications, Baghdad, Iraq

Laser and its Applications ISCLS2021-LA001

Design and Manufacturing of Magnetic Switch Using Oil and Water Based Ferrofluid and Conductive Polymers Coated With Gold and Silver Nanoparticles

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Nowadays, with the development of technology, we study conductive polymers and use them as an important magnetic switch in industrial fields. That is why these samples were fabricated from a conductive polymer layer repeatedly coated with silver and a pure ferrous fluid (oil - water) layer. In this work, the magnetic field strength (H) and its relationship to voltage (V) were studied to generate a hysterical loop for the magnetic switch using three types of lasers He-Ne, green and violet semiconductor lasers .When the sample acted as a magnetic switch. The values of the critical magnetic field (Hc) and the saturation state (Hs) values were also obtained. The results were when using the He-Ne laser for a water-based ferrofluid for gold (Hc=1.1, 0.1) and (Hs=15,1), for silver (Hc=1.1,0.1) and (Hs=14.6,1). In the case of using the green semiconductor laser, it was for gold (Hc=1.9,0.1) and (Hs=15,0.6), and for the silver (Hc=1,0.1) and (Hs=15,0.1), either in the case of violet semiconductor lasers (Hc=1,0.1) and (Hs=15,0.6), and for the silver (Hc=1.7,0.1) and (Hs=15,0.8).

Laser and its Applications ISCLS2021-LA002

Laser-Induced Fluorescence for Imaging Cancer Cells

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Cancer is one of the deadly diseases that threaten human life, so many researchers have studied diagnostic techniques as a step before surgery. These techniques are considered one of the effective methods in early detection of cancer cells. One of these modern methods is the use of laser fluorescence spectrum to image tumors, as this method has several advantages, including high sensitivity and locating the tumor in the body. In this research, the possibility of a laser operating in the visual region (532 nm) and silver nanoparticles is studied for vivo imaging of various cancerous tumors. The used detector, CCD (Genetic) type, with high sensitivity, in addition to an optical analyzer of the ocean 2000 type. A type of optical microscope was used to study the surface behavior of the tissue. The ability to diagnose the affected area using the laser induced fluorescence spectrum was observed at a very high rate, in addition to changes in the intensity of the fluorescence spectra, and the use of nanoparticles helped to identify affected cells within a single tissue.

Keywords: Fluorescence, cancer imaging, laser, Fluorescent imaging; Image-Guided Surgery

Laser and its Applications ISCLS2021-LA003

Acescars Treatment using ER:YAG Laser at Wavelength 290nm

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Er:YAG laser wave-length (2940nm) has been utilized to treat acne scars. The laser is better than the use of IPL or Nd:YAG. With the use of some processes, the skin later are absorbed laser beam especially in the superficial treatment these laser. Which is why, there is a wide range of the characteristics associated with skin layer, like stimulation of skin. The present article is dealing with the technical aspects of the Er:YAG laser use, its preferential utilization in dermatology area and also with the possible side effects and hazards. The acne scarring is one of the common dermatological conditions, causing cosmetic and psychological problems. All of the patients had mixed trophic acne scar types, which include the boxcar, ice pick, and rolling scars, even though, some certain type is predominating, which is why, it is utilized for the classification of patients in accordance.

Laser and its Applications ISCLS2021-LA004

Design DSP for NDIR Spectroscopy for Medical CO₂ Detection Modules

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Detection of exhaled CO₂ signal is a challenging task as being a very weak signal, having nearly the same absorption spectrum of H₂O.

Weak signals need a precise technique for measuring and low noise amplification, as well as accurate analog to digital conversion. Lock-in amplification considered an excellent technique for extracting weak signals in high environmental noise. To achieve this, an electrical model of the sensor was implemented as a first step, then a program was built using MATLAB for digital signal processing. In this way, selection of ADC was made easy as well as digital signal processing. Using digital lock-in amplification will reduce the cost and increase the accuracy of data acquisition system needed for NDIR CO₂ detection module without expensive circuitry.

Keywords: IR sensor, Non-dispersive Infrared (NDIR), Lock-in amplifier, Analog to digital conversion (ADC)

Laser and its Applications ISCLS2021-LA005

Influence of Pulse Duration and Water/air Cooling Ratio on Efficiency of Er:YAG Laser in Debonding of Porcelain Laminate Veneers (in vitro study)

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Objective: To determine the effectiveness of different parameters including pulse duration (PD) and water/air (W/A) cooling ratio of Er:YAG laser for debonding porcelain laminate veneers (PLV), by investigation of the consumed PLV debonding time and the changes in dental pulp temperature.

Materials and methods: Forty-six extracted non-carious human maxillary premolars were prepared for receiving PLV. Ten of them were allocated for a pilot study. Then, thirty six samples were randomly assigned to six different groups, each of them comprised six samples based on PD and W/A ratio; group A (SSP 50 μ s, 1:1), B (SSP 50 μ s, 3:3), C (MSP100 μ s, 1:1), D (MSP100 μ s, 3:3), E (SP 300 μ s, 1:1), F (SP 300 μ s, 3:3). Veneers of all groups were debonded by similar laser parameters of energy and frequency (270 mJ, 15 Hz) with non-contact application mode. Debonding time and the change of pulp temperature was recorded. Data entered onto statistical program SPSS V.22, One-Way ANOVA test was applied to study significance of differences between means for all groups, then Post Hoc Tukey test was used on 95% level of confidence.

Results: All 36 veneers were debonded. Samples of SSP and MSP PDs showed significantly shorter debonding time (7.4-17seconds) than that of SP which showed significantly the longest debonding time (104seconds) among all groups of study. However, the highest elevation of pulp temperature was observed in group E (300 μ s, 1:1) which reached (3.4°C), but it did not exceed a threshold of 5.25°C.

Conclusion: Using SSP or MSP PD of Er:YAG laser was more efficient than SP in reducing debonding time of PLVs with minimal change in pulp temperature. W/A cooling ratio had minimal influence on debonding time of PLV and dental pulp temperature when SSP or MSP PDs were used.

Keywords: Er:YAG laser, veneer, debonding, pulse duration

Laser and its Applications ISCLS2021-LA006

IOT by Using Raspberry pi for Vital Signs Monitoring

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The importance of applying E-Health systems is considered as a standard for the advancement and well-being of people. Wearable devices are widely used to monitor vital signs of patients outside the health institutions environment, compensating for the monitoring devices from the hospital. The most important challenges facing wearable health systems are the accuracy of measurement, power consumption, compact size, and real-time monitoring. The purpose of this research is to design a device that can be worn at a low cost and of a small size to provide comfort to the patient. In addition, this study takes into account power consumption and real-time remote monitoring with smart notifications in cases where the patient is in a critical situation. The Wearable Remote Vital Signs Monitoring System (WRVSMS) is manufactured by using an ECG sensor, MAX30100, temperature sensor, heart rate, SpO₂, raspberry pi 4B, display screen, GPS, and Li-ion battery. The proposed device measure and monitors four of the patient's vital signs remotely based on the Wireless Sensor Network (WSN) and cloud computing where cloud computing is integrated with the Internet of Things (IoT) to solve an issue of massive data flowing. An authorized doctor or medical staff able to monitor received data using blynk platform. Furthermore, the data are processed and different actions will be taken based on different conditions. For instance, alerting patient's helper, doctor and an ambulance in the case of emergency based on the data combining. However, all the data are stored in a database, and the stored data can be used as a medical history for patient.

Measurement of Debye Length and Landau Length for Laser Induced Plasma of Some Writing Inks Elements Using LIBS Technology

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In this work, laser breakdown technique (LIBS) was employed an approved as a good technique to vaporize the elements, in writing inks, by means of a high-capacity laser pulse to produce a hot plasma on the surface of the target sample which is a feature of the chemical composition of the sample. LIBS technology is fast and has a low cost; it does not affect the examined sample. Those features have made the demand for its use increasing in all scientific, security, biological, and other fields. Samples of different types of writing inks were examined and spectroscopically performed using a passive Q-switch Nd:YAG laser, which operates with a fundamental wavelength of 1064 nm having energy of 140 mJ and pulse duration of 10ns. The emission spectra of the samples were recorded and analyzed using Spectra Academy 2100 with a spectral range between (200nm-900nm). Debye length and Landau length of the laser-produced plasma of the ink samples were calculated, based on the basic plasma properties, which is temperature and density of the electrons, assuming the local thermal equilibrium conditions. Thus, it is possible to diagnose the formed plasma and measure its basic parameters, which can be applied in many different applications of spectroscopy of different sciences such as forensic evidence, to examine suspicious documents and detect fraud in their content.

Keywords: Debye length, Landau length, electron temperature, electron density, LIBS breakdown technique.

Laser and its Applications ISCLS2021-LA009

Aquaret Scribing Shapes by Galvanometric Scanners in Laser Machining Applications

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The implementation of laser machining system mainly targeting scribing and marking operations have been presents in this work. The high aqurate lines and high speed drawing, cause less thermal deformation in processing material. The steering of laser beam done using galvo scanning system to minimizing, the undesired markings that happened due to the fast transitions between adjacent points.

laser machining technology has been used widely in industrial applications usually with the aim of increasing the production capability of mass production lines - especially for fast marking, engraving type of applications where speed is an important concern - or manufacturing quality of a certain facility by increasing the level of accuracy in material processing applications such as drilling, cutting; or any scientific research oriented work where high precision machining of parts in sub millimeter scale might be required.

A galvanometric scanner is a high precision device that is able to steer a laser beam with a mirror attached to a motor, whose rotor angular range is usually limited with tens of degrees in both directions of rotation; and position can changed either by varying voltage or varying current. The lightness of the galvo system make the rotor and the mirror can move very fast, allowing fast marking operation with the laser beam. This can be evaluated as a great advantage compared to slower mechanical appliances used for cutting/machining of different materials.

Optics and Fiber Optics ISCLS2021-OFO001

Single Board Computer (ESP-32) Based Heart Diseases Detection

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In recent years, heart diseases raised day by day. Any issue in the electrical activity of the heart leads to cardiac disease and mortality. Cardiovascular diseases (CVDs) are associated with the heart rate. The high anxiety of heart problems is needed a health monitor system. This study presented designing and implementation a low-cost prototype device in a real-time monitoring state for heart rate and temperature with IoT technique. The designing system involves using MCU ESP-32, Arduino Nano, biomedical sensors, GSM, buzzer, LCD, and batteries. All hardware components programmed by the Arduino IDE program. When the IDE software matching with IoT software, the patient's data will send by IoT to the cloud in a continuous process at any place with display the data on LCD at the same time. An alert message sends to the doctor's mobile number in the SMS form by GSM modem when the patient's parameters override the normal healthy range. Finally, an ECG simulator device used for carrying out the study due to contain several heart rate cases ranging from (15-300) bpm.

KEYWORDS: ESP-32 MCU, Arrhythmia, IoT, Thing-Speak, GSM, ECG Simulator Device.

Optics and Fiber Optics ISCLS2021-OFO003

Synthesis High-Performance Beam Splitter (PBS) Based on Mixed Dielectric Material

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In this paper, we a an ultra-broadband high-efficiency power plate beam splitter (PBS) based on a homogeneous mixed dielectric material using laser deposition method has been fabricated. PBS fabricated by mixing MgF₂ and ZnS thin films to get new mixed dielectric material . Single layer of mixed dielectric material has been deposited on BK7 glass substrate operating in the region (400-1100nm) are provided exhibiting different (T/R) beam ratio with easy fabrication. The proposed power plate beam splitter possess high robustness as well. We expect that our technique can pave a new way for realizing high-performance mixed material based beam splitters.

Keywords

Optical interference filter ,optical coating , Beam Splitter,multilayer coating

Optics and Fiber Optics ISCLS2021-OFO004

Study the Effect of Harmful Radiation on Patients, Eyes from 15-25 Years During Using Smart Devices.

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People have become more aware of the effects of light pollution on their eyes In recent years. Short-wave blue light with a wavelength of 415 to 455 nm is closely linked to eye light impact and harm in the visible spectrum. The current study's goal was to assess the harmful effects of harmful radiation, especially blue light and ultraviolet rays, on patients' eyes aged 15 to 25 years old during us exposure.. The study was carried out at the optics consulting clinic of the Iraqi College of Health and Medical Technology in Baghdad. The current research enrolled fifty (50) patients, 28 of whom were males and 22 of whom were females, with ages ranging from 15 to 25. The data was used as a starting point (age, gender, and time of using smart devices in hours, family history, and symptoms). The smart devices are used by all patients for 2 to 5 hours. Smart devices expose patients to ultraviolet and blue rays on a continuous basis. The majority of the patients are middle school and university students, accounting for 94 % of the patient study population, and these patients were on their mobile devices for more than 3-4 hours continuously due to internet browsing, gaming, and e-learning for all students.. The majority of patients who do not wear multi-coated goggles for ages 15-20 have a significant source of eye problems (80%). After giving the patients the required instructions during their examination of the teaching clinic of optics techniques in order to minimize radiation effects, it was discovered that the majority of the patients were wearing blue cut spectacles.. Patients in the age groups of (21-25) years who wear spectacles after following the prescribed instructions account for 62% of the total. The term "plastic" refers to patients who were wearing prescription spectacles without any protection from the radiations (Filter) emitted by these smart devices. The simplest and safest approach to the problems of electromagnetic radiation on the lens of the eye and the retina caused by smart devices that use ultraviolet rays in particular is the use of blue light glasses with a wavelength of 420 nm, as well as the classification of smart device use and the protection of the eyes ideally intermittently using blue light glasses with a wavelength of 420 nm. The fundamentals cut-off blue light helps to avoid the effects of blue light produced by smart devices, which can disrupt sleep and make the human body weak.

Keywords: harmful radiation, ultraviolet rays, blue light, multi coated spectacles, smart devices.

Optics and Fiber Optics ISCLS2021-OFO005

Comparing and Analyzing Propagation of 1064 nm and 532 nm Wavelengths Laser Beams under Dusty Weather Circumstances for Optical Communication in Baghdad City.

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Comparing and analyzing propagation of 1064 nm and 532 nm are achieved. Methodology of comparison is based on increasing dust concentration levels. Different levels of weather are tested starting from semi clear, semi desert and dusty. Spectral attenuation coefficient for each level of dusty weather and specific wavelength mentioned above is obtained. Laser beam radius is calculated for each wavelength and range. The comparison is applied for point –to- pint, namely; one way path and rangefinder, namely; two ways paths. It is found as wavelength increases spectral attenuation decreases hence transmittance increases. As wavelength increases, received power at range 20.0 Km is found to be less affected compared by the shorter wavelength, 532 nm. Also, it is found as wavelength increases, laser beam radius increases too. This increase leads to lower intensity at the maximum range. Applying a beam expander is the solution to minimize increasing beam radius. 12 x expansion ratios is the optimum value for 1064 nm while 8x is the optimum value for 532 nm. The laser beam radius decreased from 225.697 cm to 11.84 cm after applying a beam expander for 1064 nm, while it decreased from 112.849 to 8.27 cm for 532 nm. In brief 1064 nm is to be advised to use for point to point and rangefinder applications unlike 532 nm which is good only for point -to- point for 20.0 Km maximum range. The research is conducted for Baghdad city.

Keyword: FSO, Visibility, Concentration, Dust , Attenuation, beam radius.

Optics and Fiber Optics ISCLS2021-OFO006

Enhanced Performance of Infrared Carbon Dioxide Gas Sensor by Using a U-Shaped Optical Cavity

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High reliability is required in modern systems to measure carbon dioxide gas through high precision, rapid reaction, compact size and low power consumption rate during CO₂ measurement. The sensor is based on principles of NDIR (Non-Dispersive Infrared) measuring technique and used to determine CO₂ gas concentration in air quality monitoring system, the measuring (NDIR) system consists of the single broadband light source, U shape tube optical path cavity as gas cell, thermopile detector, and microcontroller circuit. Throughout this study, we are investigating the efficiency of the U-tube optical path cavity and carbon dioxide measurement at concentrations ranging from (0-2000) ppm. The system design can be used for the environmental monitoring sensor.

Keywords:, CO₂ gas sensor, NDIR, thermopile sensor.

Modern Laser Technology ISCLS2021-MLT001

**Acceleration Healing of Open Wound in Rabbits by Low Level Laser and
Chitosan Powder**

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Modern Laser Technology ISCLS2021-MLT002

Implementation Study Z-Scan Technique to Measure D-Vitamin in Human Body

Bushra R. Madi, Nahla A. Al-Jabar, Ali K. Bake, Eman H. Abass, Dunia A. Al-Fatah, Dafer A. Daher and Noran Adnan

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Vitamin D is important for the human body because it is involved in the synthesis of bones, muscles, lung and brain and its normal ratio in the human body is approximately 25% to 30% and when its increase or decrease of this percentage adversely affects the different body organs. Vitamin D in the human body inaccurate and stable measurement methods. Hence the idea of using Z scan to measure the percentage of vitamin D concentration in the human body. In this paper, vitamin D samples were prepared In this research samples of vitamin D dissolved in acetone were prepared in different concentrations (0.25,0.5, 1,0.05,0.1) milligrams per liter. Samples were tested with the Z- scan closed aperture technique . This technique was applied using a continuous helium neon laser. The nonlinear refractive index of the Vitamin D was found to vary linearly with concentration. Hence by calculating the nonlinear refractive index it is possible to measure their D Vitamin concentration in the sample.

Keywords: Z-scan Technique; Nonlinear Refractive Index; Vitamin D

Modern Laser Technology ISCLS2021-MLT003

**Effect of Laser Exposure on Fatigue Behavior for Epoxy Composites
Reinforcement with Glass Fiber**

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Role of Mathematical Modelling for Cardiac Function Evaluation in Heart Failure Patients

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The development of patient-specific (PS) cardiac models is increasing exponentially in order to reach highly detailed description of anatomy and mechanical simulation of the organ. This is growing in parallel with computational tools, becoming day-by-day more and more sophisticated.

This study stands at this projection of large-scale performance of cardiac models and chases the challenge to find the right substitute for CT and MRI imaging techniques to make the modeling process easier to develop without loss of patient-specific feature. It is important to focus on using ECHO images as the source for anatomical 2D geometry for patient affected by heart failure. There are many issues in understanding a priori if the patient can benefit from CRT implantation and Echocardiography is one of the first and most common test to which the patient has to undergo in this field.

An echo image-based computational model uses data from a routine test, first used for cardiac pathological patients for quantification and assessment of the disease, looking forward for hospital resource savings.

Study the Effect of Gamma Radiation on the Self- Induced Pattern and Gaussian Beam Profile of Pyronin G Dye

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In this work, the influence of gamma irradiation on the self diffraction pattern, third-order Reflective index and Gaussian laser output profile properties of Pyronin G (C₁₇H₁₀CIN₂O) solution has been reported. Gamma-ray irradiation was performed by using a ¹³⁷Cs source with an exposure rate of 0.56 Gy/min. The pure pyronin G sample and irradiation pyronin G for different times of exposure to 21, 42 and 62 KGy γ rays for the concentration 0.08 mM have been investigated via a typical absorbance spectrum and characterized in the wavelength range 033–703 nm. The self diffraction patterns and non-linear refractive index and change refractive index , , showed concord change with different irradiation doses. Also, the diffraction rings profile of the samples have been studied using 532 nm continuous wave (cw) laser (Solid-State-Laser -532-100T). This study also suggests that gamma radiation can be considered as a tool for the improvement of device properties among other applications.

Keywords: pyronin G; laser; gamma irradiation; self diffraction patterns; refractive index.

Laser-Materials Interaction ISCLS2021-LMI003

Plasma Parameters Calculation for Iron Ion in Metal Alloy via Laser Induced Breakdown Spectroscopy

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Laser-induced breakdown spectroscopy (LIBS) is a rapid Spectro-chemical analysis technique that uses a short laser pulse to create a micro-plasma on the sample surface that uses to study atomic emission from the expanding plasma plume formed via the interaction of high peak power Nd: YAG laser passively Q-switch technique with a metal alloy. laser pulse with 200 mJ operating at the fundamental wavelength of 1064 nm, pulse duration 10ns.. In this work the iron metal was analysed using the LIBS technique.. The Fe lines, which have been analysed by the optical spectrum analyser with spectrum range (320-740 nm) with 150 pm optical resolution have been used to assess and measure of the plasma emission lines and calculate it is parameters, which represents the electron density and the plasma temperature. Measured values of (n_e) and (T_e) is in the range of ($6.28 \times 10^{16} \text{ cm}^{-3}$) and (6244.557 K°), respectively, in the fundamental wavelength.

An Analysis Study of Si Emission Lines in Heavy Hosting Metal Alloy that Induced via Laser Breakdown Spectroscopy System.

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In the present study, a laser induced breakdown spectroscopy (LIBS) was utilized for qualitative and quantitative analyses of 3 silicon alloys that have been added into the heavy material. Plasma is generated by focusing (1064 nm) Q-switched Nd: YAG laser at a 10Hz repetition rate. The spectra of the emission have been recorded with the use of an LIBS spectrometer. As these recorded lines are used to calculate the plasma properties from the electron density and the plasma temperature for the neutral and ionic spectral lines of Si element, the temperature of the plasma was computed by Boltzmann equation for each spectral line, where a clear difference is noticed between this method and the Boltzmann graph method. It is based on taking the plasma parameter values as well as the effect of the heavy substance and adding them to the alloy.

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**Effect of Particle Size on Structural Properties of Ti-6Al-4V Alloy
Treated by Laser Technique**

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