will report the unprecedented catalytic activity of the MXenes for the hydroamination of alkynes, ie an important reaction in organic synthesis for the production of imines, enamines and secondary/tertiary amines (Figure 1). The synthesis of the MXenes started from $MAlC_2$ that were delaminated by ultrasonication. The exfoliated MXenes were characterized by XRD, XPS, HRTEM and chemisorption of CO_2 and NH_3. Figures a-b depicts the performances of one of the catalysts for the hydroamination of hexyne by butyl-amine. Firstly, it demonstrated the high catalysts selectivity. Then, although the reaction occurred with a rather small conversion, the TOFs where very high for such reactions (Figure b and c) conforming the very high intrinsic activity of these catalysts.

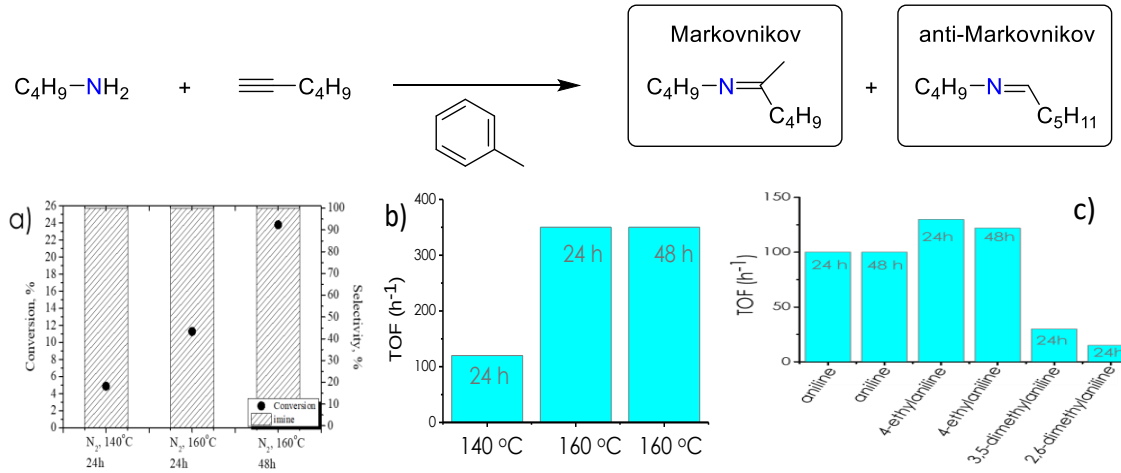

Figure 1. Catalytic performances of a TiC_2-MXene for the hydroamination of alkynes by butyl-amine

DFT calculations afforded models indicating the cooperation of neighbor Ti atoms on the reaction mechanism (Figure 2). These results permeated a better design/control of the surface disposal of these these atoms and an enhancement of the catalytic activity.

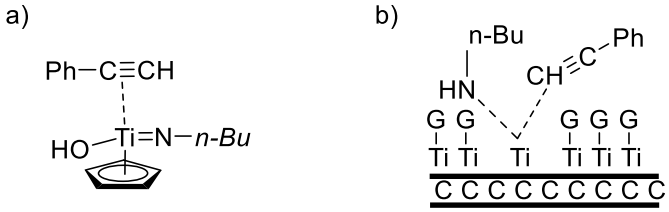

Figure 2. Models indicating the cooperation of the Ti atoms during the hydroamination of alkynes

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S5 O1

EFFECT OF CLINICAL RADIATION ON THE THERMOMECHANICAL PROPERTIES OF ABS AND PLA MATERIALS

Duygu TUNÇMAN[1], Tülin ŞAHİN[2], Songül ÇAVDAR KARAÇAM[3], Şenol ŞAHİN[2], Şefika Arzu ERGEN[4], Didem ÇOLPAN ÖKSÜZ[4]

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Effects of radiation on polymer materials can vary depending on many factors such as the type of radiation, dosage, type of polymer material, and method of application. In this study, to determine the effect of the radiation on the polymer chain structure, the degradation characteristics of PLA (Polylactic Acid) and

ABS (Acrylonitrile Butadiene Styrene) polymers were measured after radiation exposure [1]. Since the treatment continues up to about 6 weeks in radiotherapy [2], changes in thermo-mechanical, thermal, surface properties, and crystal structure were investigated to examine the effect on the characterization properties of these materials depending on the duration and dose of radiation. Samples of materials with dimensions of 100x100x10 mm were obtained with an injection machine and were categorized into 6 distinct groups. The materials were placed between the RW3 solid water phantom and the radiotherapy dose was applied to the entire area of the materials with a Linear Accelerator (LINAC) at 6 MV energy. To evaluate the impact of radiation dose, four groups underwent irradiation at predetermined dose levels, while the fifth served as a control group, and the sixth was designated for background (BG) analysis. Differential Scanning Calorimetry (DSC) and dynamic mechanical analysis (DMA) analyses were used to determine the thermal and thermo-mechanical properties of irradiated and non-irradiated materials [3]. In addition, contact angle measurement was performed to determine the properties of the irradiated surfaces. While the increasing amount of radiation did not affect the surface contact angle of the ABS material, the contact angle of the PLA material was increased significantly. There was no significant change in the melting enthalpy and glass transition temperature of both materials. However, while the specific heat of the ABS material decreased by 10% as the irradiation dose increased, the increase in the specific heat of the PLA material was 62% due to its partial crystalline structure. The glass transition temperatures of both materials in the storage module are similar to the DSC results. While the viscous property of ABS material improved at small amounts of radiation, this property deteriorated at 70 Gy. With the increasing amount of radiation of the PLA material, the cross-link density decreased and its viscous properties worsened. During radiotherapy, the change in thermo-mechanical properties of the biodegradable PLA material was found to be greater than ABS material. However, both materials are suitable for radiotherapy applications.

Keywords: ABS, PLA, DMA, Contact Angle.

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S5 O2

ANTIMONY AND TELLURIUM REINFORCED IRON PHOSPHATE GLASSES: ATTENUATION PROPERTIES AGAINST HEAVY PARTICLES AND GAMMA-RAY

Kübra Altuntaş[a], Sener Oktik[b,c], Lidya Amon Susam[a], Ayberk Yilmaz[a], Ghada ALMisned[d], Hatice Yilmaz Alan[e], Gokhan Kilic[f], Erkan Ilik[f], Gizem Ozturk[a] , Baki Akkus[a], H.O. Tekin [g,h]

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Research and development efforts focused on discovering new shielding materials for ionizing radiation have gained significant momentum, offering alternative solutions to research facilities and industries

CERTIFICATE OF PARTICIPATION

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„EFFECT OF CLINICAL RADIATION ON THE THERMOMECHANICAL PROPERTIES OF ABS AND PLA MATERIALS"

at ***22nd International Balkan Workshop on Applied Physics and Materials Science***

Florin Moscalu, PH.D.
Ovidius University of Constanta,
Workshop Chairman

09-12 July, 2024
Constanta, Romania

22nd International Balkan Workshop on Applied Physics

BOOK OF ABSTRACTS



July 9- 12, 2024

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- Applied and non-linear optics
- Ultrafast phenomena and applications

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- Accelerated particle beams
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- Nuclear Safety and Radiation Protection

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- Sensors and Device Physics
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- Imagining, Microscopy and Spectroscopy and their applications
- Instrumentation, processing, fabrication and measurement technologies
- Applications of fluid mechanics and microfluidics

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- Physics curriculum design
- Active learning techniques
- Classroom teaching, demonstrations and laboratory experiments

Topics Program

Plenary

DAY	TIME	ROOM
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FRIDAY	09:00 - 09:45 – plenary presentations	Aula B

1. Materials Physics – Section 1

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4. Cross-disciplinary Applications of Physics

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5. Engineering and Industrial Physics

DAY	TIME	ROOM
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FRIDAY	10:15 - 11:15 - oral presentations	Aula B

6. Topics in Physics Education Research

DAY	TIME	ROOM
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FRIDAY	10:15 - 11:15 - oral presentations	S20



ABSTRACTS

S5 – Engineering and Industrial Physics

- *Physics of energy transfer, conversion and storage*
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- *Sensors and Device Physics*
- *Micro- and Nanoelectronics*
- *Microelectromechanical systems*
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