K 4: Poster

Time: Monday 16:30–18:30 Location: ELP 6: Foyer

K 4.1 Mon 16:30 ELP 6: Foyer

Enhanced energy harvesting efficiency by Surface modification of PVDF/ZnS Composite Nanofibrous Membranes Using Femtosecond Pulses — •Nehal Ali[1], Elham Mostafa[2], and Amna Faid[2] — [1]Tanta University, Tanta, Egypt — [2]Cairo University, Giza, Egypt

The surface modification competence of ceramic/polymer composite is significant for electronic device applications. We report the successful patterning of a micro-grating array on the surface of an electrospun PVDF/ZnS composite membrane by femtosecond (fs) laser to fabricate efficient energy harvesting devices. The femtosecond laser is considered a versatile, speedy, and flexible tool for surface modification of different materials.

The electrospinning technique was chosen to deliver nanofibers with high β-phase content in one step. The PVDF polymeric membrane was loaded with ZnS nanoparticles to enrich the β-phase content.

The effect of laser input fluence on the morphology of patterning the nanofibers was investigated. The results showed successful patterning of tracks on the surface of the fiber while preserving its nature. The capability of the membrane as an energy harvesting device was confirmed by measuring the maximum open circuit voltage density of 1.98 V*m*2 compared to the untreated membrane of a density of 1.49 V*m-2. This work has demonstrated possible applications in electronic devices, such as sensors and actuators, in biomedical fields, such as tissue engineering.

K 4.2 Mon 16:30 ELP 6: Foyer

Two-particle self-consistent study of bi-layer Hubbard model under a static electric field — •Jiawei Yan — Department of Physics, University of Fribourg, 1700 Fribourg, Switzerland

We develop a nonequilibrium steady-state two-particle self-consistent method for Hubbard model. The theory respects the Mermin-Wagner theorem, incorporating non-local spatial fluctuations through a static vertex. By employing the Schwinger-Keldysh contour, we implement the method in real frequency. As an application, we investigate the magnetic behavior of a bi-layer Hubbard model under the influence of an electric field. We find a transition in the spin correlation between the layers, shifting from anti-ferromagnetism to ferromagnetism as the electric field intensity increases. This phenomenon is attributed to the inversion of the collective excitation spectrum within the spin channel.

K 4.3 Mon 16:30 ELP 6: Foyer

Laser-plasma coupling for etching of Zerodur — •Alexander Anthofer[1], Martin Ehrhardt[1], Pierre Lorenz[1], Thomas Arnold[1,2], and Klaus Zimmer[1] — [1]Leibniz Institute of Surface Engineering (IOM), Leipzig, Germany — [2]Technische Universität Dresden

The ever-increasing demands for high-performance optics, particularly in the areas of extreme ultraviolet and free-form optics, require continuous advances in manufacturing techniques. One such technique, atmospheric pressure plasma etching, is proving valuable in achieving both high etch rates and tooling precision for materials such as SiO2, SiC and silicon. The plasma generates reactive species that form volatile compounds with the substrate material, resulting in effective material removal. The present study investigates the effects of plasma parameters on the formation of the residual layer on Zerodur and explores the ablatability of these layers with different laser systems. The evaluation includes techniques such as white light interferometry, X-ray photoelectron spectroscopy, secondary ion mass spectrometry, and scanning electron microscopy for a comprehensive analysis of the ablation process.