19TH INTERNATIONAL CONFERENCE ON ENGINEERING & NATURAL SCIENCES

FEBRUARY 14–18, 2026 / DUBAI



CONFERENCE PROCEEDINGS BOOK

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16.02.2026
Dubai (UAE) Local Time: 11:00-13:00
Ankara (TÜRKİYE) Local Time: 10:00-12:00

(All speakers required to be connected to the session 15 min before the session starts)
Moderator is responsible for ensuring the smooth running of the presentation, managing the group discussion and dynamics.
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SESSION-1, HALL-1 / OTURUM-1, SALON-1

Meeting ID: 860 5266 6988
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HEAD OF SESSION: Ceren Orak

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Tuğba Mert Mehmet Atçeken	Sivas Cumhuriyet University	On Some Interesting Properies Of Lorentzian -Sasakian Manifolds
Furkan Aydın Başak Mesci Oktay	Ondokuz Mayıs University	Recycling Used Electric Vehicle Batteries
Mustafa Abidin Tedik Ekin Aslan Erdem Aslan	Erciyes University	Design Of A Germanium-Pillar Based Metalens For Miniaturized Thermal Imaging Systems
Yunus Emre Mavi Fatma Küçük	Ankara Yildirim Beyazit University	Adaptive Ekf For Multi-Sensor Ins/Gnss Integration
Rüstem Üstün	Akdeniz University	Determination Of Cross-Herbicide Resistance In Developed Mutant Soybean
Serpil Eryılmaz Melek Gül Irem Kulu	Amasya University	An In Silico Evaluation Of Novel Thiazole Derivative Compounds Modelled With A Fragment-Based Approach
Serpil Eryılmaz Melek Gül	Amasya University	Design, Synthesis, And Antioxidant Activity Evaluation Of A Novel Bistricyclic Oxalamide Compound: In Vitro And In Silico Studies

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DESIGN OF A GERMANIUM-PILLAR BASED METALENS FOR MINIATURIZED THERMAL IMAGING SYSTEMS

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Abstract
Metalenses are compact and versatile alternatives to traditional refractive optical elements which offer precise wavefront control via subwavelength-scale phase manipulation. Their potential for integration into optical systems is especially promising in infrared spectral range, where component miniaturization is a challenge for rapidly expanding applications such as optical communication, imaging, and sensing. This study presents the design and numerical analysis of a germanium-based dielectric metalens operating at 11 µm in the long-wave infrared (LWIR) region. This spectral region covers the part of wavelength band where the thermal imaging is accomplished. The metalens consists of germanium nanopillars with circular cross-sections that are placed on a germanium substrate. The designed focal length is 50 µm, and the metalens side length is 73.5 µm. Rigorous coupled-wave analysis (RCWA) was employed to evaluate the transmission and phase-shifting characteristics of the meta-atoms over a range of geometrical parameters. A discrete set of non-resonant metaatoms was selected to provide approximately 0 to 2π phase coverage. The optimized thickness of the proposed metalens which is determined by the height of the nanopillars is 5 µm. According to the parameter sweeps the periodicity of the metaatoms is selected as 3.5 µm. The final metalens structure was assembled based on the required phase profile and analyzed using finite-difference time-domain (FDTD) simulations. The results show a focusing efficiency of 73% at the target wavelength and focal plane. The numerical aperture of the metalens is calculated as 0.592. The simulation results validate the potential of the proposed metalens for use in the compact and high-performance long-wave infrared imaging devices.

Keywords: Metalens, nanophotonics, flat optics, all-dielectric nanophotonics, thermal imaging.

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CERTIFICATE OF PARTICIPATION

THIS IS TO CERTIFY THAT

Mustafa Abidin Tedik

attended the 19th International Conference on Engineering & Natural Sciences
held on February 14-16, 2026 / Dubai, UAE
with an oral presentation entitled

Design Of A Germanium-Pillar Based Metalens For Miniaturized Thermal Imaging Systems

Prof. Dr. Tolga KARAKÖY
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