

# Prof. HÜSNÜ EMRAH ÜNALAN

## Personal Information

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## Education Information

Doctorate, Rutgers, The State University Of New Jersey, Malzeme Bilimi Ve Mühendisliği, United States Of America 2004 - 2006

Under Graduate, Middle East Technical University, Faculty of Engineering, Department of Metallurgical and Materials Engineering, Turkey 1997 - 2002

## Research Areas

Metallurgical and Materials Engineering, Material science and engineering, Nanomaterials, Engineering and Technology

## Academic Titles / Tasks

Professor, Middle East Technical University, Faculty of Engineering, Department of Metallurgical and Materials Engineering, 2018 - Continues

Associate Professor, Middle East Technical University, Faculty of Engineering, Department of Metallurgical and Materials Engineering, 2013 - 2018

Assistant Professor, Middle East Technical University, Faculty of Engineering, Department of Metallurgical and Materials Engineering, 2009 - 2013

Lecturer PhD, Middle East Technical University, Faculty of Engineering, Department of Metallurgical and Materials Engineering, 2008 - 2009

## Professional Experience

Deputy Head of Department, Middle East Technical University, Faculty of Engineering, Department of Metallurgical and Materials Engineering, 2015 - 2018

Fakülte Yönetim Kurulu Üyesi, Middle East Technical University, Faculty of Engineering, Department of Metallurgical and Materials Engineering, 2013 - 2018

## Courses

MATERIALS RESEARCH I, Under Graduate, 2018 - 2019, 2019 - 2020

FUNDAMENTALS OF MATERIALS SCIENCE AND ENGINEERING, Under Graduate, 2018 - 2019, 2019 - 2020

RESEARCH METHODS AND ETHICS IN METALLURGICAL AND MATERIALS ENGINEERING, Post Graduate, 2018 - 2019, 2019 - 2020

MATERIALS ENGINEERING DESIGN II, Under Graduate, 2018 - 2019, 2019 - 2020

MATERIALS RESEARCH II, Under Graduate, 2018 - 2019

## Advising Theses

- Ünalán H. E. , Silver nanowire/chitosan nanocomposite dry electrodes for electrocardiogram, Post Graduate, S.KAZIM(Student), 2019
- Bayramođlu T. H. , Ünalán H. E. , Silver nanowire-decorated glass fiber filters for bacteria removal from water, Post Graduate, E.BAHÇELİOđLU(Student), 2019
- Ünalán H. E. , Silver nanowire networks on polydimethylsiloxane for organic and perovskite solar cell electrodes, Post Graduate, E.ÖZLEM(Student), 2019
- Çırpan A., Ünalán H. E. , Properties and application of graphene oxide in inverted bulk heterojunction solar cells, Doctorate, Ş.ÖZCAN(Student), 2019
- Toppare L. K. , Ünalán H. E. , Silver nanowire inks for fabrics, Post Graduate, M.NUR(Student), 2019
- Ünalán H. E. , Structural and optoelectronic properties of vanadium pentoxide thin films deposited by ultrasonic spray pyrolysis., Post Graduate, Ş.KOÇ(Student), 2019
- Ünalán H. E. , Optimization of fabrication steps for n-type c-Si solar cells, Post Graduate, E.ORHAN(Student), 2019
- Ünalán H. E. , Solution-based synthesis of silver-platinum core-shell nanowires with enhanced stability, Post Graduate, S.KOYLAN(Student), 2019
- ÜNALAN H. E. , İMAMOđLU İ., Investigation of Desalination Performance of Capacitive Deionization Technology, Post Graduate, S.ÖZKUL(Student), 2019
- İMER M. B. , ÜNALAN H. E. , Copper nanowire network based transparent thin film heaters, Post Graduate, D.TİGAN(Student), 2018
- ÜNALAN H. E. , KAYNAK C., Antimicrobial properties of 3d printed silver nanowire/poly lactide nanocomposites, Post Graduate, İ.BAYRAKTAR(Student), 2018
- DERİCİOđLU A. F. , ÜNALAN H. E. , Functional silver nanowires, Post Graduate, E.ALPUđAN(Student), 2018
- ÜNALAN H. E. , Transparent and conducting copper nanowire networks with improved oxidation stability, Post Graduate, S.POLAT(Student), 2018
- ÜNALAN H. E. , Applications of silver nanowire networks in opto-electronic devices, Doctorate, Ş.COŞKUN(Student), 2018
- TURAN R., ÜNALAN H. E. , Surface texturing study with aluminum induced texturing method on soda-lime glass substrates for thin film solar cells, Post Graduate, M.ÜNAL(Student), 2017
- DURUCAN C., ÜNALAN H. E. , Structural and optical properties of sol-gel derived nickel oxide thin films, Post Graduate, B.EKİM(Student), 2017
- ÜNALAN H. E. , Modification of single walled carbon nanotube thin films for supercapacitor electrodes, Post Graduate, M.BATUHAN(Student), 2017
- ÜNALAN H. E. , Ultrasonic spray coated inorganic thin films for electrochromic applications, Post Graduate, O.TÜREL(Student), 2017
- DURUCAN C., ÜNALAN H. E. , Structural and optoelectronic properties of sol-gel derived nickel oxide thin films, Post Graduate, B.Ekim(Student), 2017
- BEK A., ÜNALAN H. E. , Production and characterization of multilayered one dimensional plasmonic nanowires, Post Graduate, E.AYGÜN(Student), 2017
- ÇIRPAN A., ÜNALAN H. E. , Development Of Supercapacitors With One Dimensional Nanomaterials, Doctorate, R.Yüksel(Student), 2017
- ÇIRPAN A., ÜNALAN H. E. , Synthesis and Characterization Of Phenanthro Imidazole Based Conjugated Copolymer For Optoelectronic Applications, Post Graduate, N.Sohrabnia(Student), 2016
- ÇIRPAN A., ÜNALAN H. E. , Syntheses and Optoelectronic Applications Of Thiadiazolo Quinoxaline Bearing Alternating Conjugated Copolymers, Post Graduate, E.Ataođlu(Student), 2016
- TURAN R., ÜNALAN H. E. , Fabrication and characterization of carbon nanotube based supercapacitor electrodes, Post Graduate, İ.BAKIŞ(Student), 2016
- ÇIRPAN A., ÜNALAN H. E. , Synthesis and characterization of phenanthro-imidazole based conjugated copolymer for

optoelectronic applications, Post Graduate, N.Sohrabnia(Student), 2016

SOYER Y., ÜNALAN H. E. , Detection of antimicrobial effect of silver nanowires embedded in poly lactic acid (PLA) and filter paper on pathogenic bacteria, Post Graduate, C.PERK(Student), 2016

ÜNALAN H. E. , KAYNAK C., Production and characterization of polylactide/silver nanowire nanocomposite films, Post Graduate, D.DOĞANAY(Student), 2016

ÇIRPAN A., ÜNALAN H. E. , Benzotriazole and Quinoxaline Containing Random Copolymers for Bulk-Heterojunction Polymer Solar Cell Applications, Post Graduate, C.Temiz(Student), 2015

ÜNALAN H. E. , Transparent thin film heaters based on silver nanowire networks, Post Graduate, O.ERGÜN(Student), 2015

ÜNALAN H. E. , Nanostructure enhanced photovoltaic devices, Doctorate, P.AURANG(Student), 2015

ÇIRPAN A., ÜNALAN H. E. , Syntheses and Investigation of Electrochemical Properties of Selenophene and Benzotriazole Bearing Copolymers, Post Graduate, H.Ünay(Student), 2014

TURAN R., ÜNALAN H. E. , Growth, characterization and fabrication of AlGa<sub>N</sub>/Ga<sub>N</sub> high electron mobility transistors on silicon carbide substrates, Post Graduate, A.EMEN(Student), 2014

NALBANT ESENTÜRK E., ÜNALAN H. E. , Growth and characterization of branched gold nanoparticles on surfaces, Post Graduate, N.İLKEM(Student), 2014

TURAN R., ÜNALAN H. E. , Silicon nanowires for network photodetectors and plasmonic applications, Post Graduate, E.MÜLAZIMOĞLU(Student), 2013

DERİCİOĞLU A. F. , ÜNALAN H. E. , Investigation of the electromagnetic wave properties of single walled carbon nanotube thin films, Post Graduate, Ş.KÜÇÜKYILDIZ(Student), 2013

BEK A., ÜNALAN H. E. , A feasibility study for external control on self-organized production of plasmonic enhancement interfaces for solar cells, Post Graduate, M.ZOLFAGHARI(Student), 2013

DERİCİOĞLU A. F. , ÜNALAN H. E. , Investigation of the electromagnetic properties of single walled carbon nanotube thin films, Post Graduate, Ş.Küçükyıldız(Student), 2013

BEK A., ÜNALAN H. E. , A Feasibility study for external control on self-organized production of plasmonic enhancement interfaces for solar cells, Post Graduate, M.Zolfaghari(Student), 2013

TURAN R., ÜNALAN H. E. , Hydrothermal method for doping of zinc oxide nanowires and fabrication of ultraviolet photodetectors, Post Graduate, A.AFAL(Student), 2012

NALBANT ESENTÜRK E., ÜNALAN H. E. , Synthesis of gold nanowires with high aspect ratio and morphological purity, Post Graduate, E.DERTLİ(Student), 2012

ÜNALAN H. E. , Hydrothermally grown zinc oxide nanowires and their utilization in light emitting diodes and photodetectors, Post Graduate, E.SELLEN(Student), 2012

ÜNALAN H. E. , Synthesis of germanium nanowires by vapor transport and fabrication of transparent and flexible photodetectors, Post Graduate, B.AKSOY(Student), 2012

ÜNALAN H. E. , Synthesis of germanium nanowires by vapor transport and fabrication of fully transparent flexible photodetectors, Post Graduate, B.Aksoy(Student), 2012

TURAN R., ÜNALAN H. E. , A parametric study on hydrothermal synthesis of zinc oxide nanowires with various zinc salts, Post Graduate, M.CAN(Student), 2012

KUŞÇU BONNENFANT I., ÜNALAN H. E. , Tourism in Russia: From Tsarist to Post-Soviet Period, Post Graduate, H.Deniz(Student), 2012

TURAN R., ÜNALAN H. E. , Optimization of metalization in crystalline silicon solar cells, Post Graduate, O.DEMİRCİOĞLU(Student), 2012

TURAN R., ÜNALAN H. E. , Growth and characterization of indium rich indium-gallium-nitride solar cell epitaxial structures by metal organic chemical vapor deposition, Post Graduate, H.ÇAKMAK(Student), 2012

ÜNALAN H. E. , Synthesis of silver nanowires through polyol process, Post Graduate, Ş.COŞKUN(Student), 2012

ÜNALAN H. E. , TURAN R., Fabrication of silicon nanowires by electroless etching and investigation of their photovoltaic applications, Post Graduate, B.Özdemir(Student), 2011

TURAN R., ÜNALAN H. E. , Fabrication of silicon nanowires by electroless etching and investigation of their photovoltaic properties, Post Graduate, B.ÖZDEMİR(Student), 2011

## Articles Published in Journals That Entered SCI, SSCI and AHCI Indexes

- I. **Advances in protective layer-coating on metal nanowires with enhanced stability and their applications**  
Bang J., Coşkun Ş., Pyun K. R., Doğanay D., Tunca S., Koylan S., Kim D., Ünal H. E., Ko S. H.  
Applied Materials Today, vol.22, 2021 (Journal Indexed in SCI Expanded)
- II. **A Point-of-Use (POU) Water Disinfection: Silver Nanowire Decorated Glass Fiber Filters**  
Bahcelioglu E., DOĞANAY D., Coskun S., ÜNALAN H. E., Erguder T. H.  
Journal of Water Process Engineering, vol.38, 2020 (Journal Indexed in SCI Expanded)
- III. **Facile preparation of nanoparticle based SERS substrates for trace molecule detection**  
Demirta O., DOĞANAY D., ÖZTÜRK İ. M., ÜNALAN H. E., BEK A.  
PHYSICAL CHEMISTRY CHEMICAL PHYSICS, vol.22, no.37, pp.21139-21146, 2020 (Journal Indexed in SCI)
- IV. **All-Solution-Processed, Oxidation-Resistant Copper Nanowire Networks for Optoelectronic Applications with Year-Long Stability**  
Genlik S. P., TİGAN D., Kocak Y., Ercan K. E., ÇİÇEK M. Ö., Tunca S., KOYLAN S., Coskun S., ÖZENSOY E., ÜNALAN H. E.  
ACS APPLIED MATERIALS & INTERFACES, vol.12, no.40, pp.45136-45144, 2020 (Journal Indexed in SCI)
- V. **Wearable supercapacitors based on nickel tungstate decorated commercial cotton fabrics**  
Hekmat F., TUTEL Y., Unalan H. E.  
INTERNATIONAL JOURNAL OF ENERGY RESEARCH, vol.44, no.9, pp.7603-7616, 2020 (Journal Indexed in SCI)
- VI. **Silver-based nanomaterials: A critical review on factors affecting water disinfection performance and silver release**  
Bahcelioglu E., ÜNALAN H. E., Erguder T. H.  
CRITICAL REVIEWS IN ENVIRONMENTAL SCIENCE AND TECHNOLOGY, 2020 (Journal Indexed in SCI)
- VII. **Hybrid energy storage device from binder-free zinc-cobalt sulfide decorated biomass-derived carbon microspheres and pyrolyzed polyaniline nanotube-iron oxide**  
Hekmat F., Hosseini H., Shahrokhian S., ÜNALAN H. E.  
ENERGY STORAGE MATERIALS, vol.25, pp.621-635, 2020 (Journal Indexed in SCI)
- VIII. **Biomass-derived wearable energy storage systems based on poplar tree-cotton fibers coupled with binary nickel-cobalt nanostructures**  
Hekmat F., ÜNALAN H. E., Shahrokhian S.  
SUSTAINABLE ENERGY & FUELS, vol.4, no.2, pp.643-654, 2020 (Journal Indexed in SCI)
- IX. **Plasmonic light-management interfaces by polyol-synthesized silver nanoparticles for industrial scale silicon solar cells**  
Birant G., ÖZTÜRK İ. M., DOĞANAY D., ÜNALAN H. E., BEK A.  
ACS Applied Nano Materials, 2020 (Journal Indexed in SCI Expanded)
- X. **Stretchable/flexible silver nanowire electrodes for energy device applications**  
Jung J., Cho H., Yuksel R., Kim D., Lee H., Kwon J., Lee P., Yeo J., Hong S., ÜNALAN H. E., et al.  
NANOSCALE, vol.11, no.43, pp.20356-20378, 2019 (Journal Indexed in SCI)
- XI. **3D printed antibacterial silver nanowire/poly lactide nanocomposites**  
Bayraktar I., DOĞANAY D., Coskun S., KAYNAK C., Akca G., ÜNALAN H. E.  
Composites Part B: Engineering, vol.172, pp.671-678, 2019 (Journal Indexed in SCI)
- XII. **Core/shell copper nanowire networks for transparent thin film heaters**  
Tigan D., Genlik S. P., Imer B., ÜNALAN H. E.  
NANOTECHNOLOGY, vol.30, no.32, 2019 (Journal Indexed in SCI)
- XIII. **Silver-nanowire-modified fabrics for wide-spectrum antimicrobial applications**  
Doganay Y., Kanicioglu A., Coskun S., Akca G., ÜNALAN H. E.  
JOURNAL OF MATERIALS RESEARCH, vol.34, no.4, pp.500-509, 2019 (Journal Indexed in SCI)
- XIV. **Vertically aligned carbon nanotube - Polyaniline nanocomposite supercapacitor electrodes**  
AYDINLI A., YÜKSEL R., ÜNALAN H. E.  
INTERNATIONAL JOURNAL OF HYDROGEN ENERGY, vol.43, no.40, pp.18617-18625, 2018 (Journal Indexed in SCI)

- XV. **All-carbon hybrids for high performance supercapacitors**  
YÜKSEL R., Kaplan B. Y. , Bicer E., Yurum A., Gursel S. A. , ÜNALAN H. E.  
INTERNATIONAL JOURNAL OF ENERGY RESEARCH, vol.42, no.11, pp.3575-3587, 2018 (Journal Indexed in SCI)
- XVI. **Opto-thermoelectric nanotweezers**  
LIN L., WANG M., PENG X., LISSEK E. N. , MAO Z., SCARABELLI L., ADKINS E., Coskun S., ÜNALAN H. E. , KORGEL B. A. , et al.  
NATURE PHOTONICS, vol.12, no.4, pp.195-202, 2018 (Journal Indexed in SCI)
- XVII. **Photovoltaic performance of CdS/CdTe junctions on ZnO nanorod arrays**  
Kartopu G., Turkyay D., Özcan C., Hadibrata W., Aurang P., Yerci S., Ünalán H. E. , Barrioz V., Qu Y., Bowen L., et al.  
SOLAR ENERGY MATERIALS AND SOLAR CELLS, vol.176, pp.100-108, 2018 (Journal Indexed in SCI)
- XVIII. **A Novel Blue to Transparent Polymer for Electrochromic Supercapacitor Electrodes**  
YÜKSEL R., EKBER A., TURAN J., ALPUGAN E., HACIOGLU S. O. , TOPPARE L. K. , ÇIRPAN A., GUNBAS G., ÜNALAN H. E.  
ELECTROANALYSIS, vol.30, no.2, pp.266-273, 2018 (Journal Indexed in SCI)
- XIX. **Coaxial silver nanowire/polypyrrole nanocomposite supercapacitors**  
YÜKSEL R., ALPUGAN E., ÜNALAN H. E.  
ORGANIC ELECTRONICS, vol.52, pp.272-280, 2018 (Journal Indexed in SCI)
- XX. **Paper Based, Expanded Graphite/Polypyrrole Nanocomposite Supercapacitors Free from Binders and Current Collectors**  
YÜKSEL R., UYSAL N., AYDINLI A., ÜNALAN H. E.  
JOURNAL OF THE ELECTROCHEMICAL SOCIETY, vol.165, no.2, 2018 (Journal Indexed in SCI)
- XXI. **Heat transfer enhancement by silver nanowire suspensions in microchannel heat sinks**  
SIMSEK E., Coskun S., OKUTUCU-OZYURT T., ÜNALAN H. E.  
INTERNATIONAL JOURNAL OF THERMAL SCIENCES, vol.123, pp.1-13, 2018 (Journal Indexed in SCI)
- XXII. **Nanowire decorated, ultra-thin, single crystalline silicon for photovoltaic devices**  
AURANG P., TURAN R., ÜNALAN H. E.  
NANOTECHNOLOGY, vol.28, no.40, 2017 (Journal Indexed in SCI)
- XXIII. **Metal oxide surfaces for enhanced colorimetric response in bioassays**  
Bonyi E., Kukoyi Z., Daodu O., Boone-Kukoyi Z., COŞKUN S., ÜNALAN H. E. , Asian K.  
COLLOIDS AND SURFACES B-BIOINTERFACES, vol.154, pp.331-340, 2017 (Journal Indexed in SCI)
- XXIV. **A New High-Performance Blue to Transmissive Electrochromic Material and Use of Silver Nanowire Network Electrodes as Substrates**  
YÜKSEL R., ATAĞLU E., TURAN J., ALPUGAN E., HACIOGLU S. O. , TOPPARE L., ÇIRPAN A., ÜNALAN H. E. , GUNBAS G.  
JOURNAL OF POLYMER SCIENCE PART A-POLYMER CHEMISTRY, vol.55, no.10, pp.1680-1686, 2017 (Journal Indexed in SCI)
- XXV. **A novel approach for the fabrication of a flexible glucose biosensor: The combination of vertically aligned CNTs and a conjugated polymer**  
GOKOGLAN T. C. , SOYLEMEZ S., KESİK M., DOGRU I. B. , TUREL O., YÜKSEL R., ÜNALAN H. E. , TOPPARE L.  
FOOD CHEMISTRY, vol.220, pp.299-305, 2017 (Journal Indexed in SCI)
- XXVI. **Enhancing capacitive deionization technology as an effective method for water treatment using commercially available graphene**  
DURSUN D., OZKUL S., YÜKSEL R., ÜNALAN H. E.  
WATER SCIENCE AND TECHNOLOGY, vol.75, no.3, pp.643-649, 2017 (Journal Indexed in SCI)
- XXVII. **Sequential Deposition of Electrochromic MoO<sub>3</sub> Thin Films with High Coloration Efficiency and Stability**  
Turel O., Hacıoğlu S. O. , Coskun S., Toppare L., ÜNALAN H. E.  
JOURNAL OF THE ELECTROCHEMICAL SOCIETY, vol.164, no.14, 2017 (Journal Indexed in SCI)
- XXVIII. **Paper Based Glucose Biosensor Using Graphene Modified with a Conducting Polymer and Gold Nanoparticles**  
GOKOGLAN T. C. , KESİK M., SOYLEMEZ S., YÜKSEL R., ÜNALAN H. E. , TOPPARE L.

- JOURNAL OF THE ELECTROCHEMICAL SOCIETY, vol.164, no.6, 2017 (Journal Indexed in SCI)
- XXIX. **Genotoxicity study of high aspect ratio silver nanowires**  
Charehsaz M., COŞKUN S., ÜNALAN H. E. , Reis R., Helvacioğlu S., GIRI A. K. , Aydın A.  
TOXICOLOGICAL AND ENVIRONMENTAL CHEMISTRY, vol.99, pp.837-847, 2017 (Journal Indexed in SCI)
- XXX. **Manganese dioxide nanowires on carbon nanofiber frameworks for efficient electrochemical device electrodes**  
SAITO Y., MEGURO M., ASHIZAWA M., WAKI K., YUKSEL R., ÜNALAN H. E. , MATSUMOTO H.  
RSC ADVANCES, vol.7, no.20, pp.12351-12358, 2017 (Journal Indexed in SCI)
- XXXI. **Silver Nanowire/Conducting Polymer Nanocomposite Electrochromic Supercapacitor Electrodes**  
YÜKSEL R., COŞKUN S., GUNBAS G., ÇIRPAN A., TOPPARE L., ÜNALAN H. E.  
JOURNAL OF THE ELECTROCHEMICAL SOCIETY, vol.164, no.4, 2017 (Journal Indexed in SCI)
- XXXII. **Silver nanowire networks as transparent top electrodes for silicon solar cells**  
AURANG P., DOĞANAY D., BEK A., TURAN R., ÜNALAN H. E.  
SOLAR ENERGY, vol.141, pp.110-117, 2017 (Journal Indexed in SCI)
- XXXIII. **Suppressed Hysteretic Field Emission From Polymer Encapsulated Silver Nanowires**  
Cole M. T. , COŞKUN S., Parmee R. J. , Hiralal P., CEPEK C., Robertson A. W. , LI C., DAI Q., Warner J. H. , Milne W. I. , et al.  
IEEE TRANSACTIONS ON NANOTECHNOLOGY, vol.16, no.1, pp.11-15, 2017 (Journal Indexed in SCI)
- XXXIV. **Cobalt Oxide Nanoflakes on Single Walled Carbon Nanotube Thin Films for Supercapacitor Electrodes**  
DURUKAN M. B. , Yuksel R., ÜNALAN H. E.  
ELECTROCHIMICA ACTA, vol.222, pp.1475-1482, 2016 (Journal Indexed in SCI)
- XXXV. **High-performance, bare silver nanowire network transparent heaters**  
Ergun O., Coskun S., Yusufoglu Y., ÜNALAN H. E.  
NANOTECHNOLOGY, vol.27, no.44, 2016 (Journal Indexed in SCI)
- XXXVI. **Silver nanowire decorated heatable textiles**  
DOĞANAY D., Coskun S., Genlik S. P. , ÜNALAN H. E.  
NANOTECHNOLOGY, vol.27, no.43, 2016 (Journal Indexed in SCI)
- XXXVII. **Flexible, silver nanowire network nickel hydroxide core-shell electrodes for supercapacitors**  
YUKSEL R., Coskun S., KALAY Y. E. , ÜNALAN H. E.  
JOURNAL OF POWER SOURCES, vol.328, pp.167-173, 2016 (Journal Indexed in SCI)
- XXXVIII. **Electrical, mechanical and thermal properties of aligned silver nanowire/poly lactide nanocomposite films**  
DOĞANAY D., Coskun S., KAYNAK C., ÜNALAN H. E.  
COMPOSITES PART B-ENGINEERING, vol.99, pp.288-296, 2016 (Journal Indexed in SCI)
- XXXIX. **All Solution-Based Fabrication of Copper Oxide Thin Film/Cobalt-Doped Zinc Oxide Nanowire Heterojunctions**  
AKSOY F., AKGÜL G., TURAN R., ÜNALAN H. E.  
JOURNAL OF THE AMERICAN CERAMIC SOCIETY, vol.99, no.7, pp.2497-2503, 2016 (Journal Indexed in SCI)
- XL. **An effective surface design based on a conjugated polymer and silver nanowires for the detection of paraoxon in tap water and milk**  
Turan J., Kesik M., SÖYLEMEZ S., Goker S., Coskun S., ÜNALAN H. E. , TOPPARE L. K.  
SENSORS AND ACTUATORS B-CHEMICAL, vol.228, pp.278-286, 2016 (Journal Indexed in SCI)
- XLI. **Flexible supercapacitor electrodes with vertically aligned carbon nanotubes grown on aluminum foils**  
Dogru I. B. , DURUKAN M. B. , Turel O., ÜNALAN H. E.  
PROGRESS IN NATURAL SCIENCE-MATERIALS INTERNATIONAL, vol.26, no.3, pp.232-236, 2016 (Journal Indexed in SCI)
- XLII. **Photovoltaic performance of Gallium-doped ZnO thin film/Si nanowires heterojunction diodes**  
Akgul G., Akgul F. A. , ÜNALAN H. E. , TURAN R.  
PHILOSOPHICAL MAGAZINE, vol.96, no.11, pp.1093-1109, 2016 (Journal Indexed in SCI)

- XLIII. **Coaxial silver nanowire network core molybdenum oxide shell supercapacitor electrodes**  
Yuksel R., Coskun S., ÜNALAN H. E.  
ELECTROCHIMICA ACTA, vol.193, pp.39-44, 2016 (Journal Indexed in SCI)
- XLIV. **Ternary nanocomposite SWNT/WO3/PANI thin film electrodes for supercapacitors**  
Yuksel R., DURUCAN C., ÜNALAN H. E.  
JOURNAL OF ALLOYS AND COMPOUNDS, vol.658, pp.183-189, 2016 (Journal Indexed in SCI)
- XLV. **Enhanced second harmonic generation from coupled asymmetric plasmonic metal nanostructures**  
Yıldız B. C. , Taşgın M. E. , Abak M. K. , Coskun S., Ünal H. E. , Bek A.  
JOURNAL OF OPTICS, vol.17, 2015 (Journal Indexed in SCI)
- XLVI. **Textile supercapacitors-based on MnO<sub>2</sub>/SWNT/conducting polymer ternary composites**  
Yuksel R., ÜNALAN H. E.  
INTERNATIONAL JOURNAL OF ENERGY RESEARCH, vol.39, no.15, pp.2042-2052, 2015 (Journal Indexed in SCI)
- XLVII. **Enhanced diode performance in cadmium telluride-silicon nanowire heterostructures**  
AKSOY F., Akgul G., Gullu H. H. , ÜNALAN H. E. , TURAN R.  
JOURNAL OF ALLOYS AND COMPOUNDS, vol.644, pp.131-139, 2015 (Journal Indexed in SCI)
- XLVIII. **Improved diode properties in zinc telluride thin film-silicon nanowire heterojunctions**  
AKSOY F., AKGÜL G., Gullu H. H. , ÜNALAN H. E. , TURAN R.  
PHILOSOPHICAL MAGAZINE, vol.95, no.11, pp.1164-1183, 2015 (Journal Indexed in SCI)
- XLIX. **Metal-Enhanced Fluorescence from Silver Nanowires with High Aspect Ratio on Glass Slides for Biosensing Applications**  
Abel B., Coskun S., Mohammed M., Williams R., ÜNALAN H. E. , Aslan K.  
JOURNAL OF PHYSICAL CHEMISTRY C, vol.119, no.1, pp.675-684, 2015 (Journal Indexed in SCI)
- L. **Growth of branched gold nanoparticles on solid surfaces and their use as surface-enhanced Raman scattering substrates**  
Nalbant Esentürk E., Coskun S., Kozanoglu D., Ertas G., Ünal H. E. , Nalbant Esentürk E.  
RSC ADVANCES, vol.5, pp.101656-101663, 2015 (Journal Indexed in SCI)
- LI. **All-Organic Electrochromic Supercapacitor Electrodes**  
YÜKSEL R., CEVHER Ş. C. , ÇIRPAN A., TOPPARE L., ÜNALAN H. E.  
JOURNAL OF THE ELECTROCHEMICAL SOCIETY, vol.162, no.14, 2015 (Journal Indexed in SCI)
- LII. **Influence of thermal annealing on microstructural, morphological, optical properties and surface electronic structure of copper oxide thin films**  
AKSOY F., AKGÜL G., Yildirim N., ÜNALAN H. E. , TURAN R.  
MATERIALS CHEMISTRY AND PHYSICS, vol.147, no.3, pp.987-995, 2014 (Journal Indexed in SCI)
- LIII. **Transparent and Flexible Supercapacitors with Single Walled Carbon Nanotube Thin Film Electrodes**  
YÜKSEL R., SARIOBA Z., ÇIRPAN A., Hiralal P., ÜNALAN H. E.  
ACS APPLIED MATERIALS & INTERFACES, vol.6, no.17, pp.15434-15439, 2014 (Journal Indexed in SCI)
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### **XL. Polyaniline - Carbon Nanotube Nanocomposite Electrodes for Supercapacitors**

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### **XLI. Gümüş nanotellerin suların dezenfeksiyonu amaçlı değerlendirilmesi**

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### **XLIII. Single Walled Carbon Nanotube Thin Films Decorated with Cobalt Oxide Nanoflakes for Supercapacitor Electrodes**

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### **XLV. Metalorganic chemical vapour deposition and performance of CdS/CdTe junctions on ZnO nanorodarrays**

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### **XLVII. Enhanced second harmonic generation from coupled asymmetric plasmonic metal nanostructures**

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### **XLVIII. Silver Nanowire Polypyrrole Nanocomposites for Supercapacitors**

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### **XLIX. Silicon Solar Cells With Silver Nanowire Network Top Electrodes**

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### **L. Vertically Aligned Carbon Nanotube Polyaniline Nanocomposite Electrodes for Supercapacitors**

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- LI. Flexible Silver Nanowire Networks for High Frequency Shielding**  
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- LII. Stability and Opto Electronic Properties of Nickel Oxide Silver Nanowire Nanocomposite Electrodes**  
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- LIII. Graphene Polypyrrole Nanocomposite Electrodes for Paper Based Supercapacitors**  
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- LIV. Silver Nanowire Nickel Hydroxide Nanocomposites for Pseudocapacitors**  
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- LV. Characterization of Silver Nanowire Modified Textile Heaters**  
DOĞANAY D., COŞKUN Ş., POLAT GENLİK S., ÜNALAN H. E.  
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- LVI. Metal nanowire networks as transparent contacts**  
ÜNALAN H. E.  
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- LVII. An effective surface design based on a conjugated polymer and silver nanowires for the detection of paraoxon in tap water and milk**  
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- LVIII. All plasmonic enhancement of second harmonic generation via interference of conversion paths**  
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- LIX. Silver Nanowire Coated Heatable Textiles**  
DOĞANAY D., COŞKUN Ş., ÜNALAN H. E.  
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- LX. SILVER NANOWIRE COATED HEATABLE TEXTILES**  
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- LXI. Silver Nanowire Networks as Transparent Top Electrodes For Single Crystalline Silicon Solar Cells**  
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- LXII. SILVER NANOWIRE NETWORK AS TRANSPARENT TOP ELECTRODE FOR SILICON SOLAR CELLS**  
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- LXIII. Transparent Contacts With Metal Nanowire Networks**  
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- LXIV. Fabrication of ZnO CdS CdTe core shell nanorod arrays for extremely thin absorber eta CdTe solar cells**  
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- LXV. Molecular Activation by Plasmon Enhanced Nonlinear Conversion**  
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Alpugan E., COŞKUN Ş., DERİCİOĞLU A. F., ÜNALAN H. E.

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- LXVII. **Metal enhanced fluorescence from silver nanowires with high aspect ratio on plana surfaces for biosensing applications**  
aslan k, biele a., enock b., ÜNALAN H. E. , COŞKUN Ş.  
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- LXVIII. **Electrical Properties of Silver Nanowire Polylactide Nanocomposite Films**  
DOĞANAY D., Çoşkun Ş., KAYNAK C., ÜNALAN H. E.  
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- LXIX. **Single Walled Carbon Nanotube Conducting Polymer Electrodes for Electrochromic Supercapacitors**  
YÜKSEL R., ÇIRPAN A., ÜNALAN H. E.  
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- LXX. **Nanowire Decorated Ultrathin Silicon Solar Cells**  
Aurang P., ES F., TURAN R., ÜNALAN H. E.  
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- LXXI. **Optoelectronic Properties Of Nickel Oxide Thin Films Elaborated by Sol Gel**  
saraç b. e. , COŞKUN Ş., ÜNALAN H. E. , DURUCAN C.  
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- LXXII. **Silver Nanowire Molybdenum Oxide Nanocomposite Electrodes for Flexible Supercapacitors**  
YÜKSEL R., COŞKUN Ş., DURUCAN C., ÜNALAN H. E.  
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- LXXIII. **Electromagnetic Interface Shielding Behavior of Silver Nanowire Networks**  
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- LXXIV. **A Comparative Analysis of Silver Nanowire Network Indium Tin Oxide and Traditional Metal Contacts for Nitride Light Emitting Diodes**  
Açan M. B. , COŞKUN Ş., ÜNALAN H. E. , İMER M. B.  
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- LXXV. **Single Walled Carbon Nanotube Cobalt Oxide Nanocomposites as Supercapacitor Electrode Materials**  
DURUKAN M. B. , YÜKSEL R., ÜNALAN H. E.  
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- LXXVI. **Electrical Conductivity of Silver Nanowire Polylactide Nanocomposite Films**  
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- LXXVII. **Enhanced second harmonic generation from coupled asymmetric plasmonic metal nanostructures**  
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- LXXVIII. **Nanowire Decorated Ultrathin Single Crystalline Silicon for Photovoltaic Devices**  
Aurang P., Hadibrata W., YERCI S., TURAN R., ÜNALAN H. E.  
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- LXXIX. **Effects of Silver Nanowires on the Behavior of Polylactide Nanocomposite Films**  
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- LXXX. **Silver Nanowire Molybdenum Oxide Nanocomposite Electrodes for Organic Light Emitting Diodes**  
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- LXXXI. **Textile Based Ternary Nanocomposite Supercapacitors**  
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- LXXXII. **Light management on industrial size c-Si solar cells by Si nanowires fabricated by metal-assisted etching**



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ÜNALAN H. E. , BOYACIGİLLER E., Project Supported by Higher Education Institutions, GÜMÜŞ NANOTEL İLE ÜRETİLEN AKILLI TEKSTİL ÜRÜNLERİNİN DOKUNMATİK ALGILAYICI OLARAK KULLANILMASI, 2018 - 2020

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ÜNALAN H. E. , AKSOY B., Project Supported by Higher Education Institutions, GERMANYUM NANOTELLERİN ELEKTRONİK CİHAZLARDA KULLANILMASI, 2013 - 2013

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## Citations

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## Invited Talks

Transparent Contacts With Metal Nanowire Networks , Seminar, South Korea, December 2018

## Awards

Ünalan H. E. , Bilim Akademisi Genç Bilim İnsanı Ödülü , Bilim Akademisi, April 2015

Ünalan H. E. , TÜBİTAK Teşvik Ödülü , Tübitak, December 2014

Ünalan H. E. , Eser Tümen Üstün Başarı Ödülü, Feyzi Akkaya Bilimsel Etkinlikleri Destekleme Fonu (Fated) , October 2013

Ünalan H. E. , Yılın Bilim İnsanı Ödülü , Bilim Kahramanları Derneği, June 2013

Ünalan H. E. , Türkiye Bilimler Akademisi (TÜBA) Üstün Başarılı Genç Bilim İnsanı (GEBİP) Ödülü , Tüba, May 2009