

Disiplinlerarası'ndan Disiplinlerötesi'ne

DÜŞÜNCELER, PATENTLER ve UYGULAMALAR



M. Pınar Mengüç

Enerji, Çevre ve Ekonomi Merkezi (CEEE/EÇEM)
Özyeğin Üniversitesi
İstanbul



ÜSİMP Üniversite Sanayi İşbirliği Ulusal Kongresi
16 Kasım 2021



CEE/EEEM @ OZU

Thermal Radiation Heat Transfer

Seventh Edition

John R. Howell
M. Pinar Mengüç
Kyle Daun
Robert Siegel

 CRC Press
Taylor & Francis Group

ENERJİ SİSTEMLERİ

IŞINIMLA ISI TRANSFERİ ve UYGULAMALARI

SÜRDÜRÜLEBİLİR ENERJİ

KARMAŞIK SİSTEMLER

CRC Press, Taylor & Francis, 2021

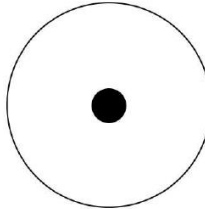


CEEE/EÇEM @ OzU

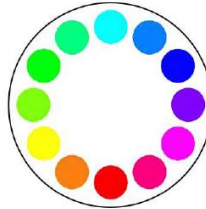
İKLİM KRİZİ'NİN ETKİLERİNİ AZALTMAK ANCAK...

DİSPLİNLER-ARASI & DİSİPLİNLER-ÖTESİ

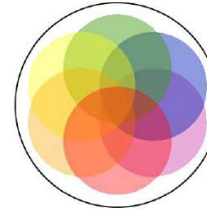
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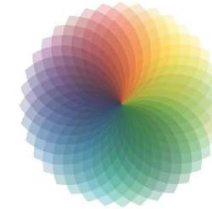
Intradisciplinary



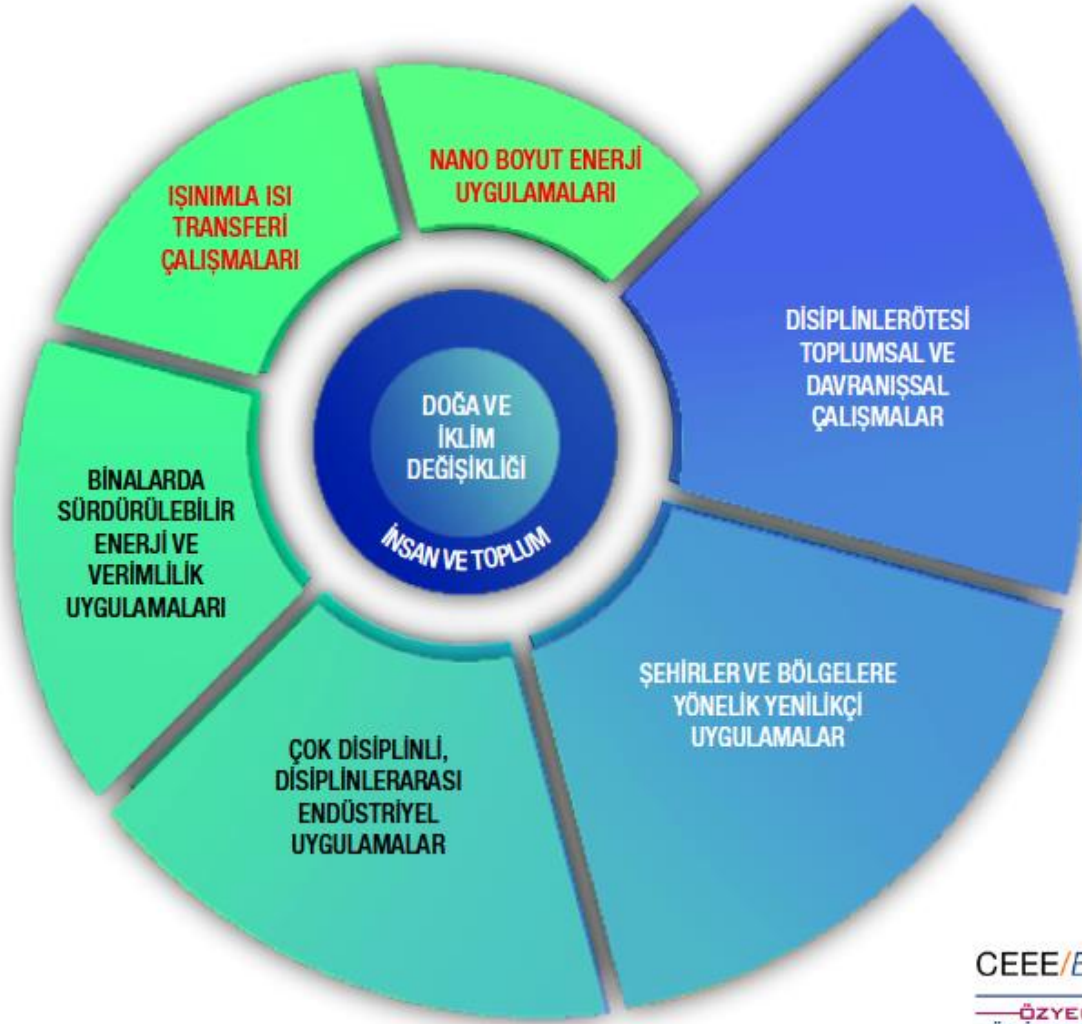
Multidisciplinary



Interdisciplinary



Transdisciplinary



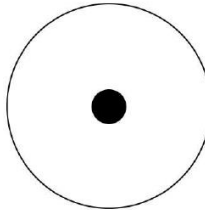
CEEE/EÇEM

ÖZYEGİN
ÜNİVERSİTESİ

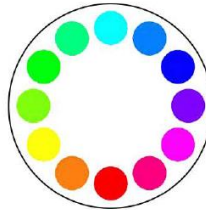


CEEE/EÇEM @ OzU

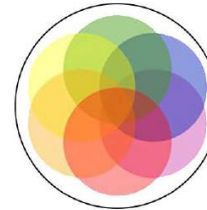
SANAYİ UYGULAMALARINA DOĞRU GELİŞTİRİLMİŞ PATENTLERDEN ÖRNEKLER:



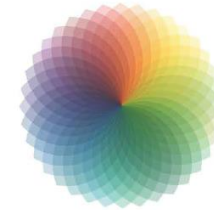
Intradisciplinary



Multidisciplinary



Interdisciplinary



Transdisciplinary

ALEV KONTROLÜ



US005797736A

United States Patent [19]
Mengüç et al.

[11] **Patent Number:** 5,797,736
[45] **Date of Patent:** Aug. 25, 1998



[54] **RADIATION MODULATOR SYSTEM**

[75] **Inventors:** M. Pinar Mengüç; Bruce L. Walcott;
Stephen R. Swabb; Michael A.
Marra, III, all of Lexington, Ky.

[73] **Assignee:** University of Kentucky Research
Foundation, Lexington, Ky.

[21] **Appl. No.:** 757,695

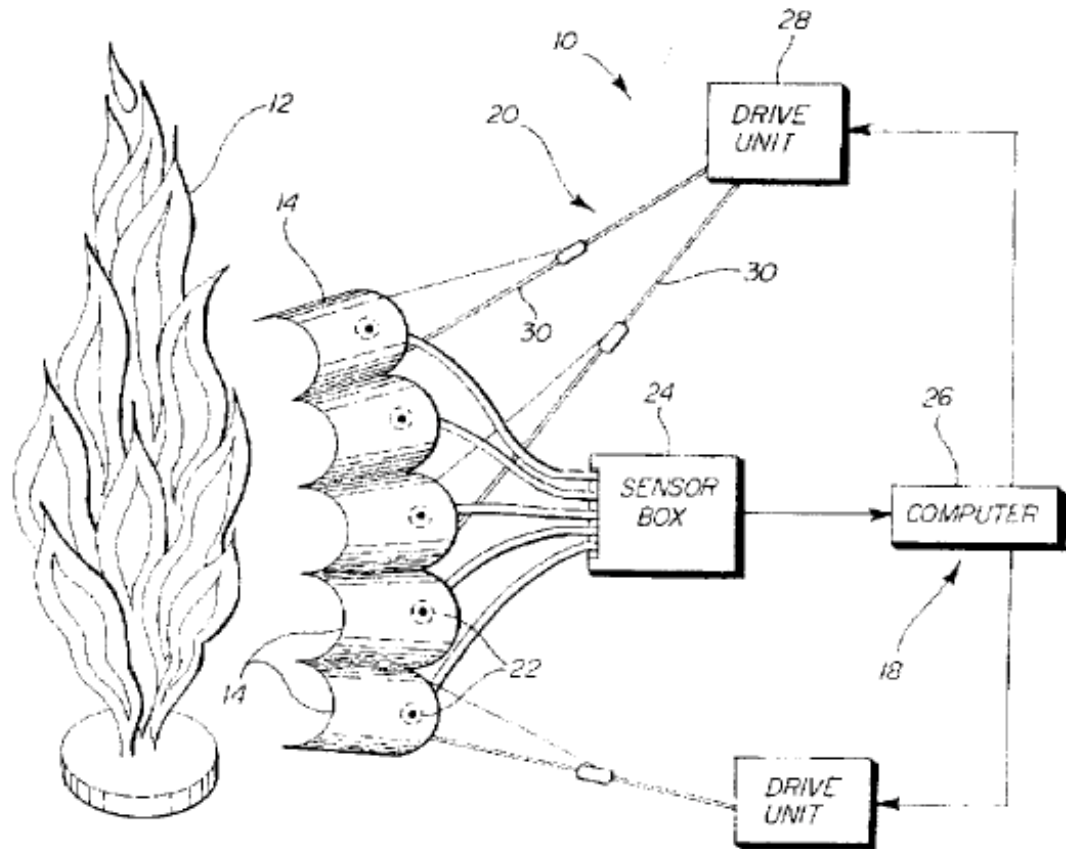
[22] **Filed:** Dec. 3, 1996

[51] **Int. CL⁶** F23N 5/

[52] **U.S. CL** 431/75; 431/2; 431/1

OTHER PUBLICATIONS

Manickavasagam et al.; Scattering Matrix Elements of Fractal Like Soot Agglomerates; Applied Optics; vol. 36, No. 6;



Patent by
Mengüç, Walcott, Swabb,
Marra,
August 25, 1998;
#5,797,736

NANO-PARÇACIK ÖLÇME SİSTEMİ



US 20020057433A1



(19) **United States**

(12) **Patent Application Publication**
Menguc et al.

(10) **Pub. No.: US 2002/0057433 A1**

(43) **Pub. Date: May 16, 2002**

(54) **NON-INTRUSIVE METHOD AND APPARATUS FOR CHARACTERIZING PARTICLES BASED ON SCATTERING MATRIX ELEMENTS MEASUREMENTS USING ELLIPTICALLY POLARIZED RADIATION**

of provisional application No. 60/233,864, filed on Sep. 20, 2000.

Publication Classification

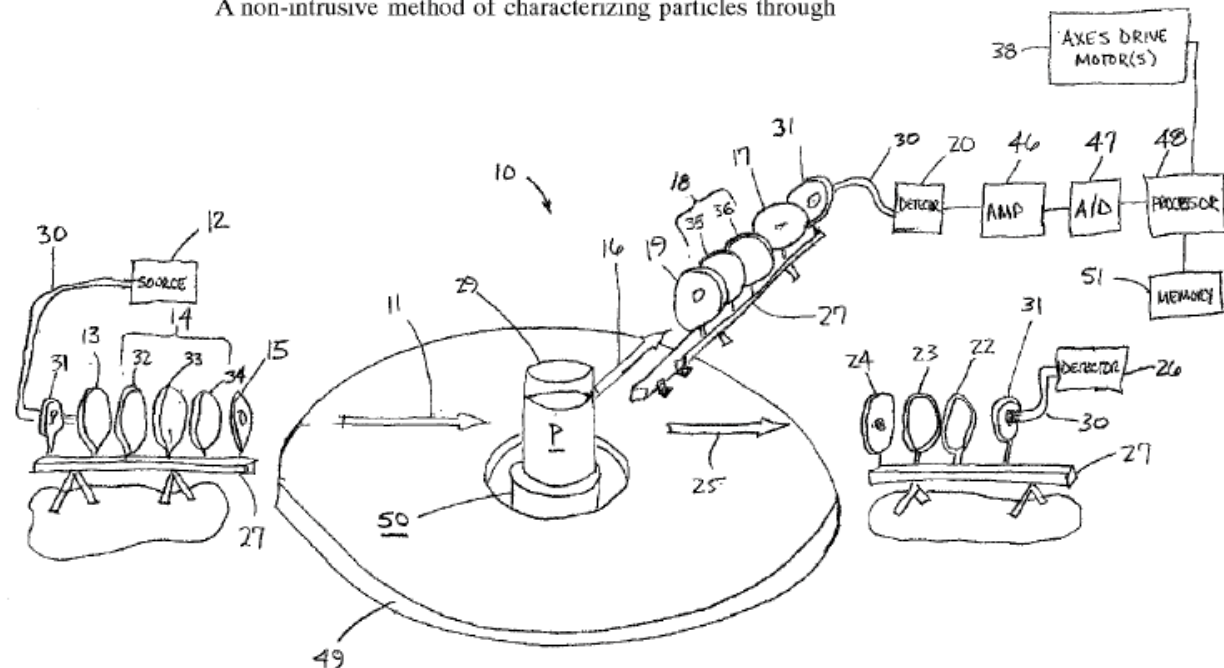
(51) **Int. Cl.⁷ G01J 4/00**

(52) **U.S. Cl. 356/369**

(76) **Inventors:** M. Pinar Menguc, Lexington, KY (US); Sivakumar Manickavasagam, Albany, NY (US)

(57) **ABSTRACT**

A non-intrusive method of characterizing particles through



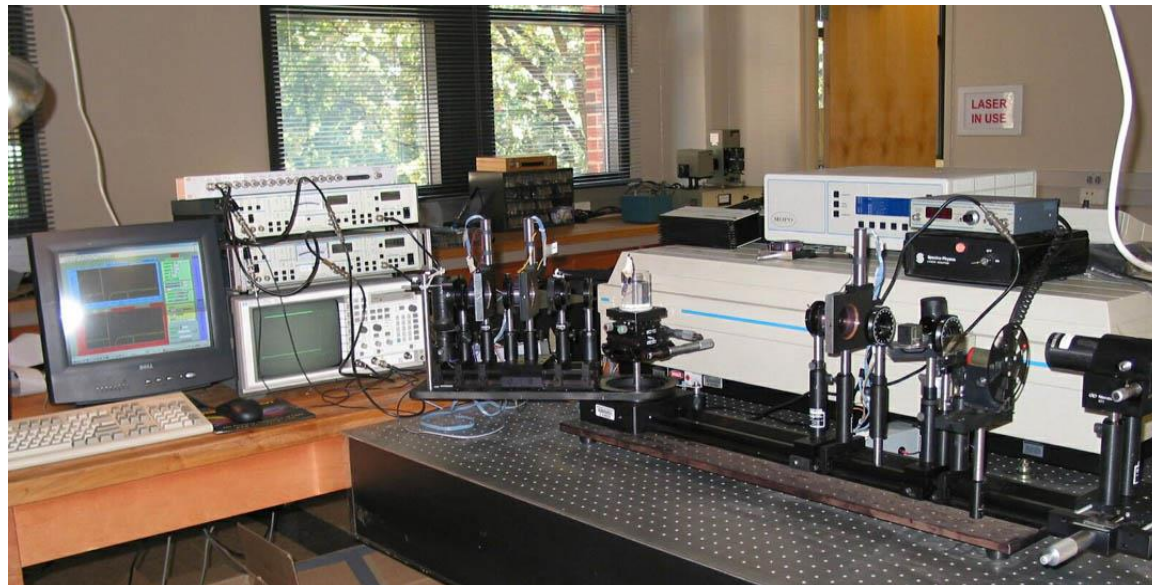
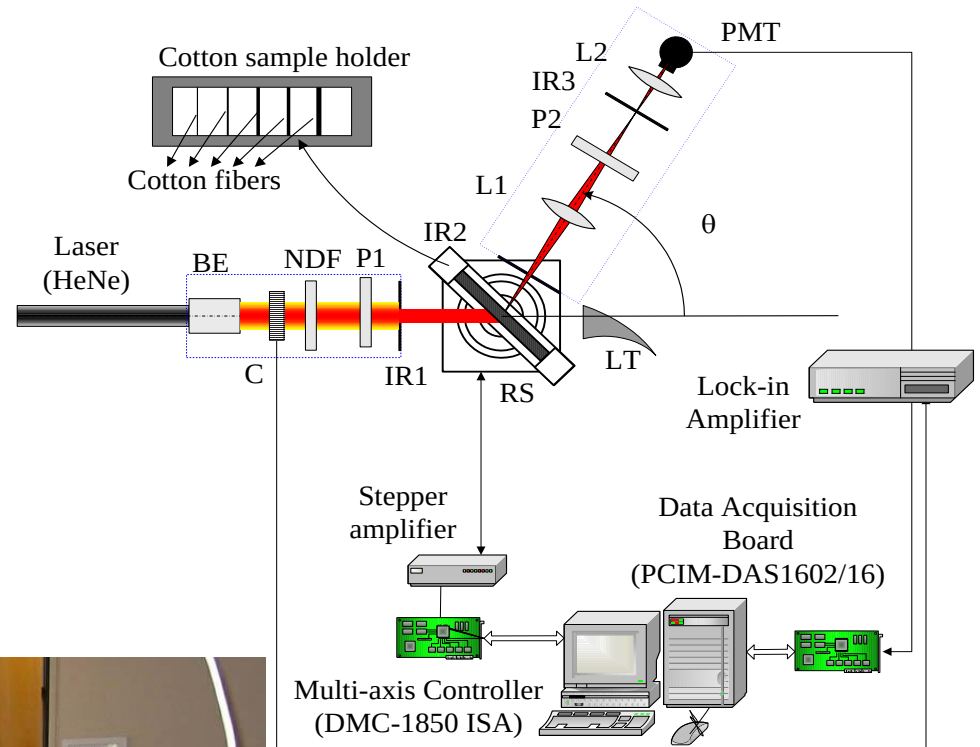
R&D 100 Award, 2003

**Patent by
Mengüç and
Manickavasagam,
April 13, 2004;
#6,721,051**

NANO-PARÇACIK ÖLÇME SİSTEMİ

Experimental System:

Precision Nephelometer.
To measure different particle
shapes and sizes
down to 50-70 nm



With ...

S. Manickavasagam, M. Aslan
JQSRT 2006; JNR 2006

NANO-PARÇACIK ÖLÇME SİSTEMİ



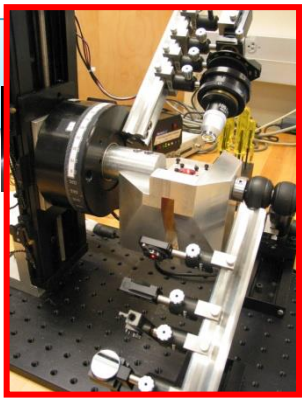
HORIBA

R&D 100 Award, 2003



Patent by
Mengüç and
Manickavasagam,
April 13, 2004;
#6,721,051

NANO-ÖTESİ

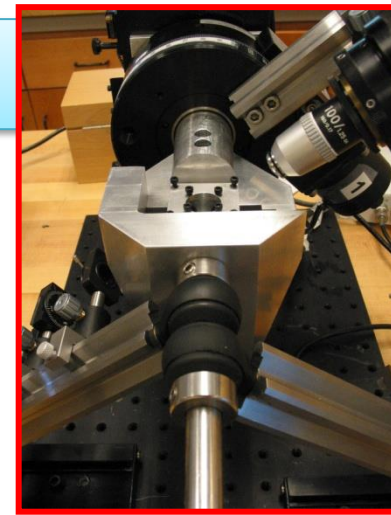
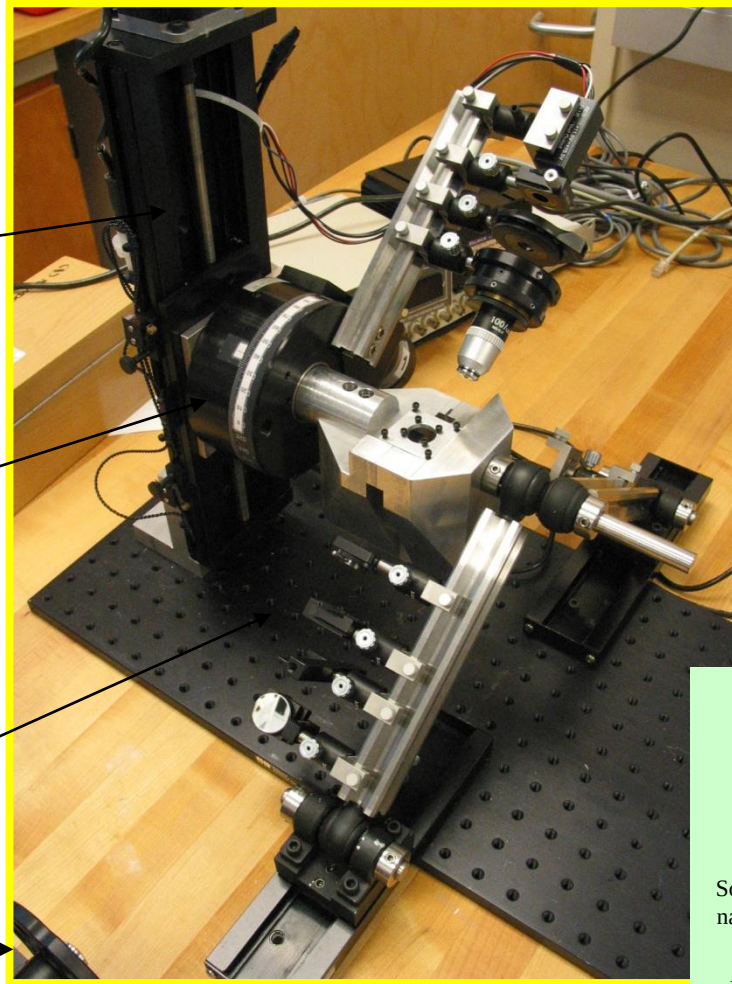


Translation stage to control incident angle

Rotational stage

Incident light optics

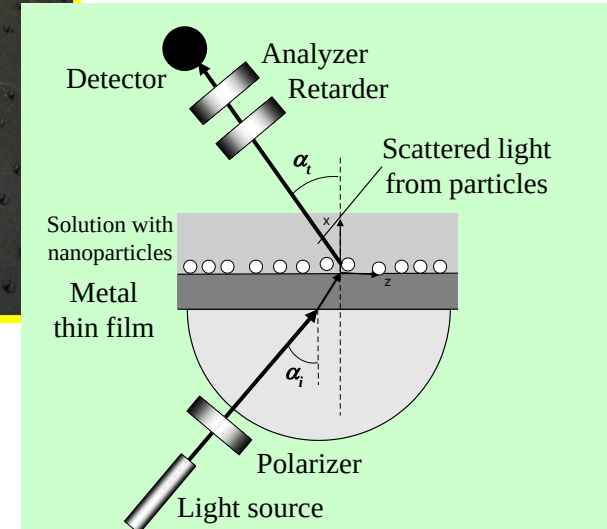
Light source



PMT

Motor Control Unit

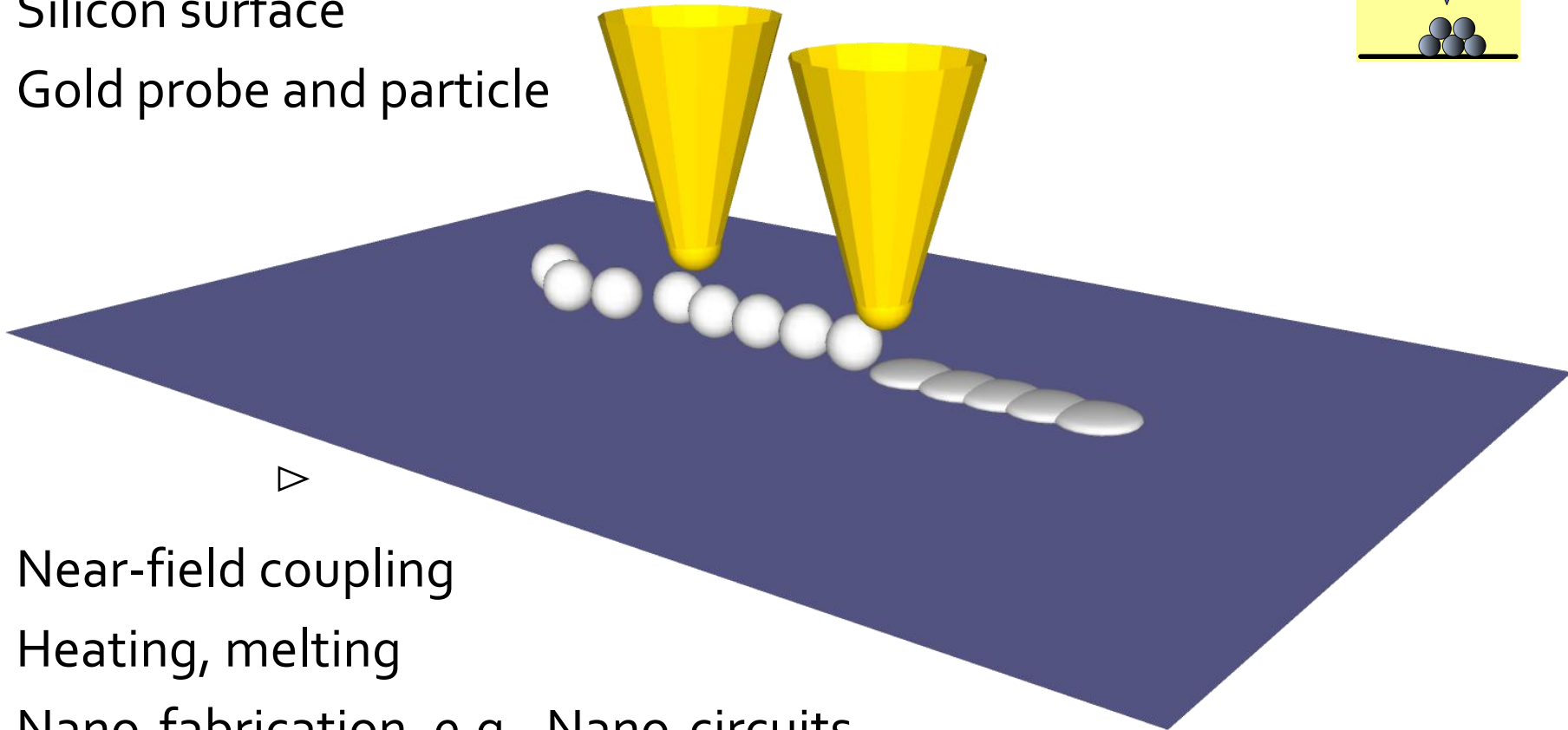
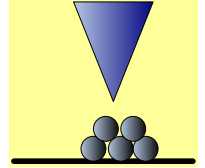
Scattered light optics



With M. Francoeur, R. Vaillon, M. Aslan
Nano-Scale Diagnostics and Harvesting

AFM BAZLI NANO-BOYUT İŞLEME

- ▷ • Silicon surface
- Gold probe and particle



- Near-field coupling
- Heating, melting
- Nano-fabrication, e.g., Nano-circuits

E. A. Hawes, J. T. Hastings, C. Crofcheck and M. P. Mengüç, "Spatially selective melting and evaporation of nanosized gold particles," *Optics Letter* 33, 1383–1385 (2008).

(12) **United States Patent**
Vallance et al.

(10) **Patent No.:** **US 6,660,959 B2**
(45) **Date of Patent:** **Dec. 9, 2003**

(54) **PROCESSES FOR NANOMACHINING USING CARBON NANOTUBES**

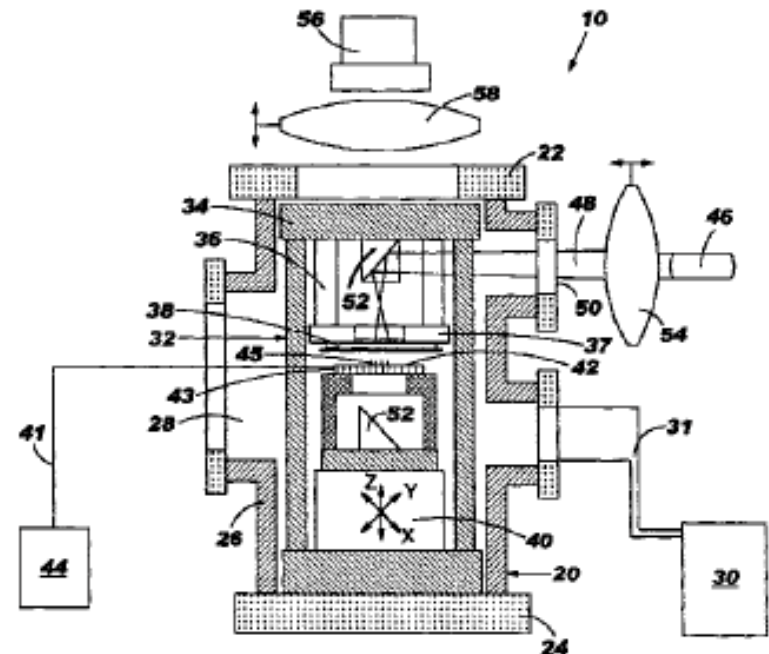
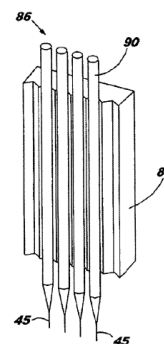
(75) **Inventors:** **Robert Ryan Vallance**, Lexington, KY (US); **Apparao M. Rao**, Anderson, SC (US); **M. Pinar Menguc**, Lexington, KY (US)

Bonard, Jean-Marc et al. Field emission from single-wall carbon nanotube films. Applied physics letters. Vol. 73, No. 7. Aug. 1998.

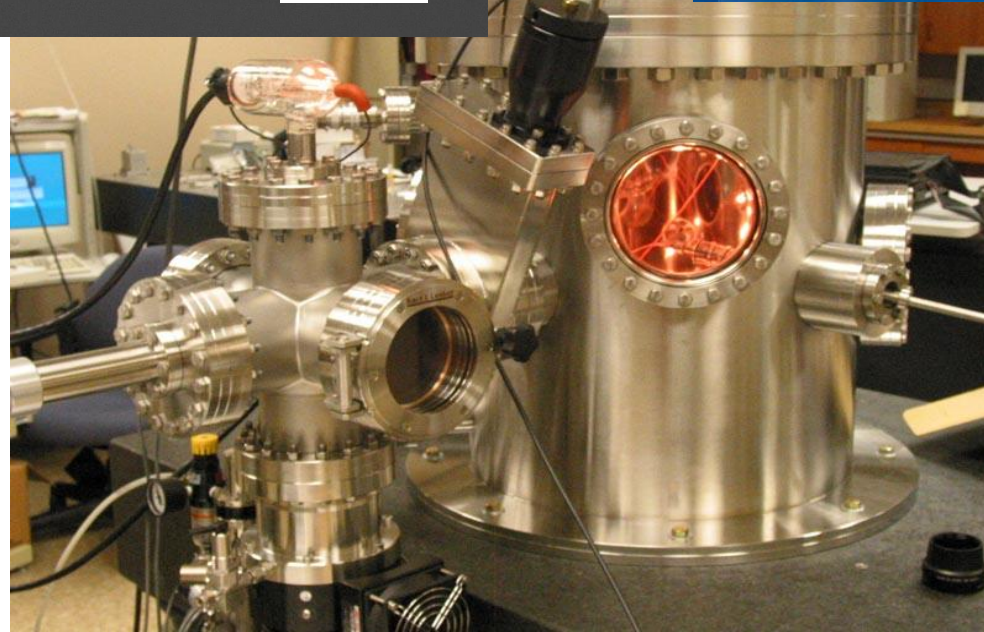
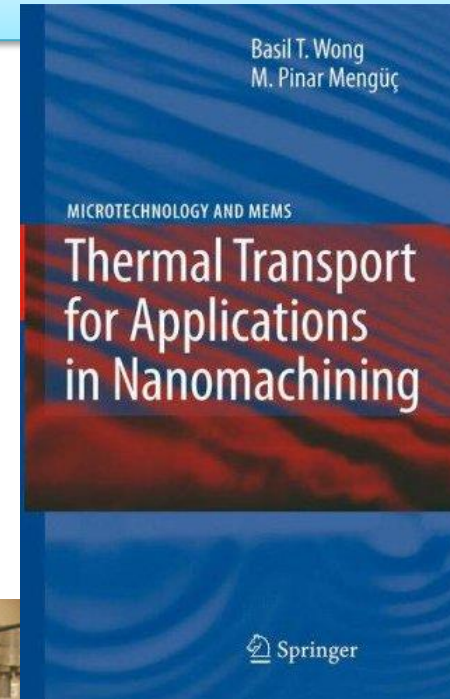
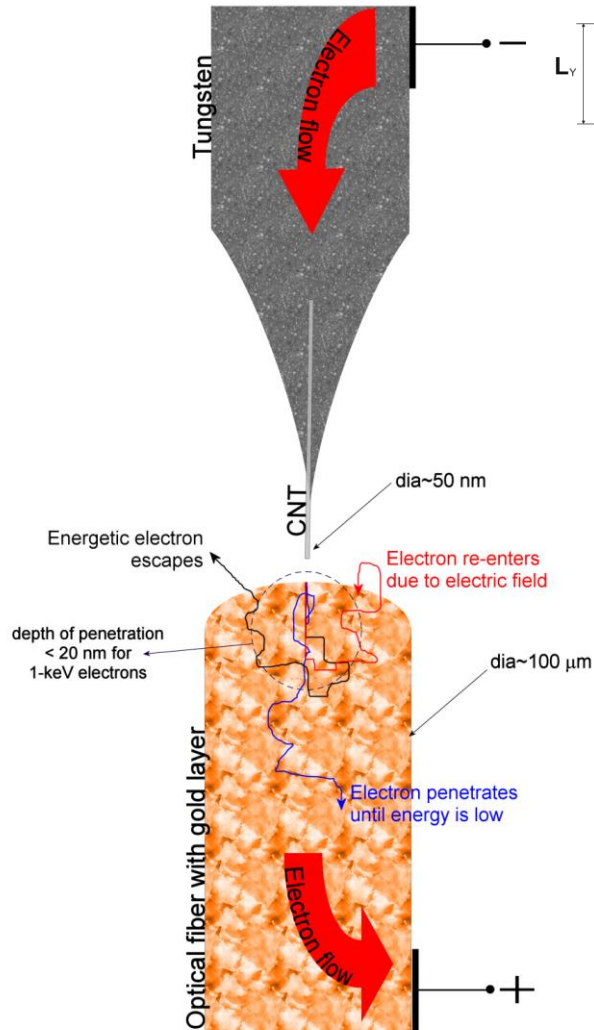
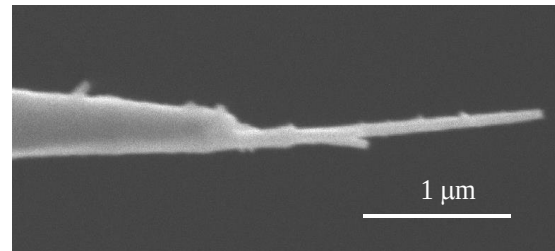
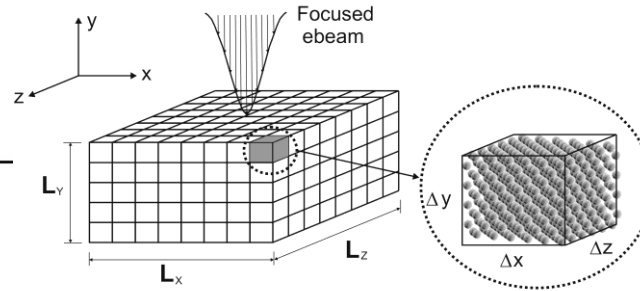
Hirakawa et al. Electron emission properties of carbon nanotubes. Applied Surface Science. 160-170 (2001)

Patent by
Vallance, Rao, Mengüç
December 9, 2003; #6,660,959

FIG. 4A



ELEKTRON IŞINIYLA İŞLEME



YÜZEY İŞLEMEDE DENEYSEL ETKİ



(12) **United States Patent** **Reppert et al.**

(10) **Patent No.:** **US 7,818,816 B1**
(45) **Date of Patent:** **Oct. 19, 2010**

(54) **SUBSTRATE PATTERNING BY ELECTRON EMISSION-INDUCED DISPLACEMENT**

(75) Inventors: **Jason B. Reppert**, Central, SC (US);
Jay B. Gaillard, Yadkinville, NC (US);
Bevan C. Elliott, Greenville, SC (US);
Doyl E. Dickel, Central, SC (US); **M.**
Pinar Mengüç, Lexington, KY (US);
Apparao M. Rao, Anderson, SC (US)

(73) Assignee: **Clemson University Research
Foundation**, Anderson, SC (US)

(*) Notice: Subject to any disclaimer, the term of this
patent is extended or adjusted under 35
U.S.C. 154(b) by 213 days.

(21) Appl. No.: 12/243,402

5,849,173 A	12/1998	Chandross et al.	
5,861,549 A	1/1999	Neukermans et al.	
6,279,389 B1	8/2001	Adderton et al.	
6,997,039 B2	2/2006	Rao et al.	
7,514,214 B2 *	4/2009	Wade et al.	435/6
7,687,876 B2 *	3/2010	Kabir	257/471
2003/0222668 A1	12/2003	Hung et al.	
2007/0194225 A1 *	8/2007	Zorn	250/306

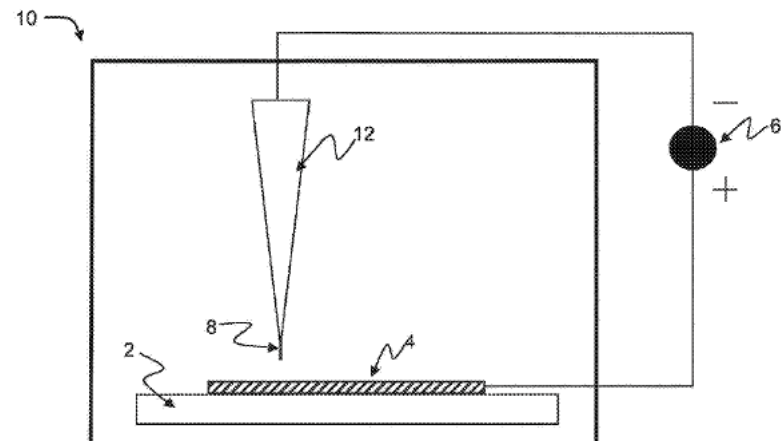
OTHER PUBLICATIONS

Brongersma, et al., "Electromagnetic energy transfer and switching
in nanoparticle chain arrays below the diffraction limit", vol. 62, No.
24, Dec. 2000.

* cited by examiner

Primary Examiner—Nikita Wells

(74)



Patent by
Rupport ... Rao, Mengüç
October 19, 2010; #7,818,816

YÜZEY İŞLEMEDE DENEYSEL ETKİ

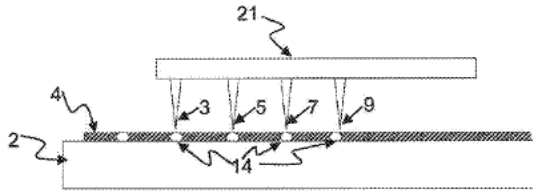


Figure 3

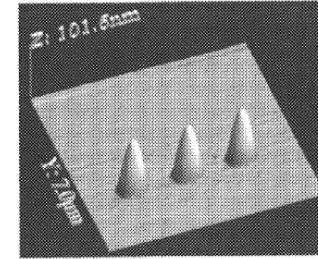


Figure 13

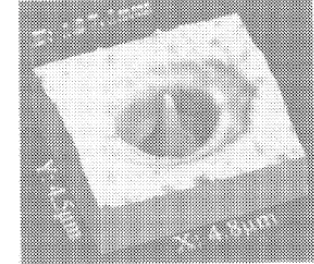


Figure 14

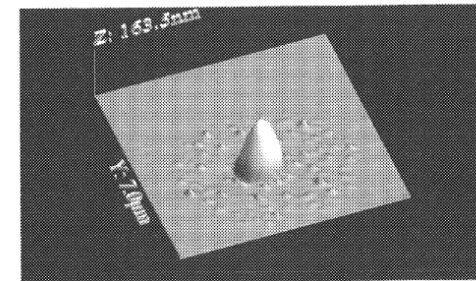
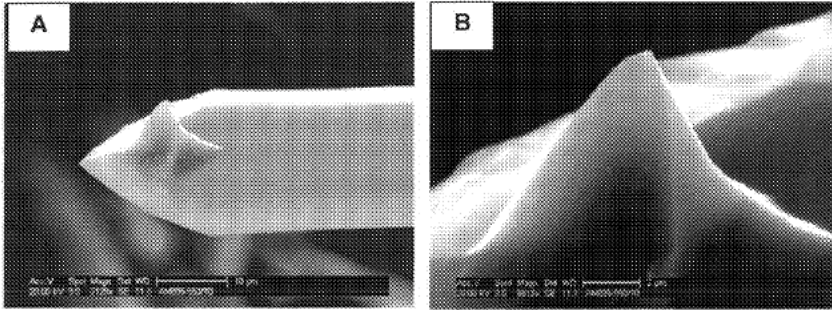


Figure 9A

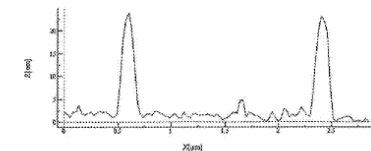
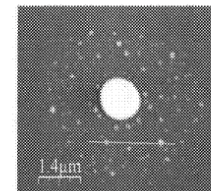
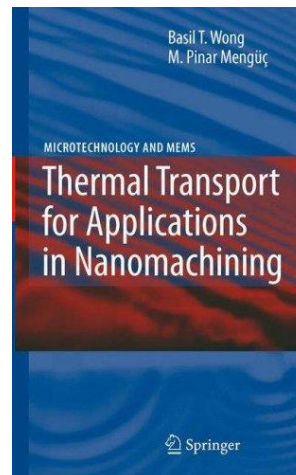


Figure 9C

**Patent by
Rupput ... Rao, Mengüç
October 19, 2010; #7,818,816**





ÖNCEDEN BAŞLAYAN ARAŞTIRMA KONULARI... RTL

OPTİK VE IŞINIMLA ISI TRANSFERİ

*Combustion, Particle Characterization,
Nano-Scale Sensing, Diagnostics, Manufacturing*



EÇEM ARAŞTIRMA KONULARI

OPTİK VE IŞINIMLA ISI TRANSFERİ +++

+++ BİNALAR VE ŞEHİRLER

#RADIATIVE TRANSFER
#EM-WAVE SCATTERING
#NANO-SCALE ENERGY HARVESTING



Işınımsal Isı Transferi
Nano-Boyut Enerji Hadaslama ve Soğuma
Binalarda Enerji Verimliliği
Termal ve Görsel Konfor
Entegre Mimarlık ve Mühendislik
Sürdürülebilir Sistemler için Malzemeler ve Kavramlar

#SUSTAINABLE BUILDINGS
#ENERGY EFFICIENCY
#HUMAN-BUILDING INTERACTIONS
#OPTICS IN BUILDINGS
#COMFORT
#SERIOUS GAME

PLASMONIC NANO-BOYUT ENERJİ HADASLAMA

US 20100031990A1

(19) **United States**

(12) **Patent Application Publication**
Francoeur et al.

(10) **Pub. No.: US 2010/0031990 A1**

(43) **Pub. Date: Feb. 11, 2010**

(54) **CASCADED PHOTOVOLTAIC AND THERMOPHOTVOLTAIC ENERGY CONVERSION APPARATUS WITH NEAR-FIELD RADIATION TRANSFER ENHANCEMENT AT NANOSCALE GAPS**

Publication Classification

(51) **Int. Cl.**
H01L 35/00 (2006.01)
H01L 21/50 (2006.01)
(52) **U.S. Cl.** **136/206; 438/55; 257/E21.499**

(75) **Inventors:** **Mathieu Francoeur**, Lexington, KY (US); **Rodolphe Vaillon**, Lyon (FR); **M. Pinar Menguc**, Lexington, KY (US)

Correspondence Address:
CROWELL & MORING LLP
INTELLECTUAL PROPERTY GROUP
P.O. BOX 14300
WASHINGTON, DC 20044-4300 (US)

(73) **Assignee:** **University of Kentucky Research Foundation**, Lexington, KY (US)

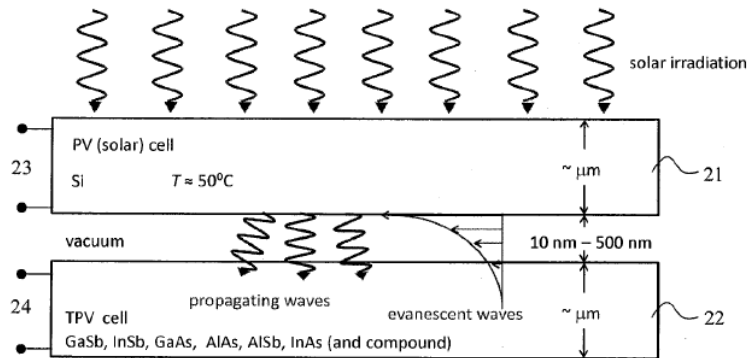
(21) **Appl. No.:** **12/534,322**

(22) **Filed:** **Aug. 3, 2009**

ABSTRACT

A cascaded photovoltaic/thermophotovoltaic energy conversion apparatus, a cascaded thermophotovoltaic energy conversion apparatus, and a method for forming the apparatuses are provided. The cascaded photovoltaic/thermophotovoltaic apparatus includes a photovoltaic device that receives solar radiation on an upper surface thereof and produces a first electric current output and a thermal radiation output, and a thermophotovoltaic device disposed a predetermined distance below a lower surface of the photovoltaic device, the thermophotovoltaic device receiving the thermal radiation output and converting the received thermal radiation output into a second electric current output. The cascaded thermophotovoltaic apparatus includes a radiator maintained at constant temperature via an external heat input on its upper surface and produces a thermal radiation output, and a thermophotovoltaic device disposed a predetermined distance

Patent application by
Francoeur, Vaillon, Mengüç



OzU'da 3 proje

Öğrenciler:

OzU / Boğaziçi U./ Sabancı U./ METU

PLASMONİK SOĞUMA

(19) **United States**

(12) **Patent Application Publication**
Kursat Sendur et al.

(10) **Pub. No.: US 2014/0246171 A1**
(43) **Pub. Date: Sep. 4, 2014**

(54) **NANOPLASMONIC DEVICE WITH
NANOSCALE COOLING**

(86) PCT No.: **PCT/US2011/054929**
§ 371 (c)(1),
(2), (4) Date: **Apr. 10, 2014**

(75) Inventors: **Ibrahim Kursat Sendur**, Istanbul (TR);
Ali Kosar, Istanbul (TR); **Mustafa
Pinar Menguc**, Istanbul (TR)

Publication Classification

(73) Assignees: **OZYEGIN UNIVERSITY**,
ALTUNIZADE 34662, ISTANBUL
(TR); **SABANCI UNIVERSITY**,
ORHANLI - TUZLA, 34956,
ISTANBUL (TR)

(51) **Int. Cl.**
F28F 27/00 (2006.01)
(52) **U.S. Cl.**
CPC **F28F 27/00** (2013.01)
USPC **165/58**

(21) Appl. No.: **14/349,050**

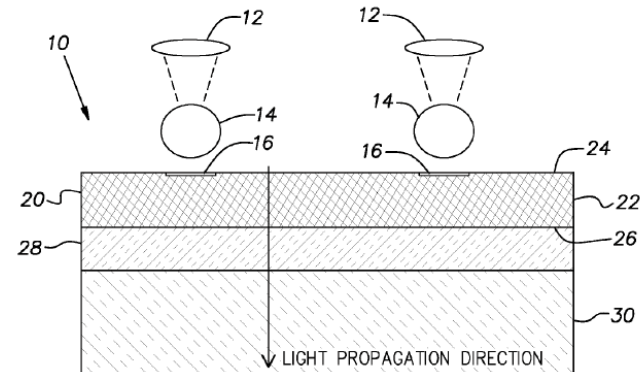
ABSTRACT

(22) PCT Filed: **Oct. 5, 2011**

A nanoplasmonic device includes a nanoplasmonically heat-able layer having a heating side and a cooling side, the heat-able layer including a plurality of localized energy receiving sites; and a cooling structure located adjacent to the cooling side, the cooling structure including a nanoscale structure to remove heat from the heated layer.

**Patent by
Şendur, Koşar, Mengüç
September 4, 2014**

Sabancı Üniversitesi araştırmacılarıyla birlikte
Japonya, Çin, Güney Kore, Avrupa Birliği..



TOPAKLANMA ÖNLEMEK İÇİN AKIŞKAN SİSTEMİ

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
27 April 2017 (27.04.2017)



(10) International Publication Number
WO 2017/069712 AI

FLOW SYSTEM FOR AVOIDING PARTICLE AGLOMERATION

EU: EPO; EP3365627B1

JP: JPO; JP6559363B2

USA: USTPO; US10837604B2

(51) International Patent Classification:

F28F 13/08 (2006.01) F28F 23/02 (2006.01)
B82Y 30/00 (2011.01) COM 5/10 (2006.01)
F15D 1/02 (2006.01)

(21) International Application Number:

PCT/TR20 15/050 145

(22) International Filing Date:

22 October 2015 (22.10.2015)

(25) Filing Language:

English

(26) Publication Language:

English

(71) Applicants: SABANCI ÜNİVERSİTESİ [TR/TR]; Orta Mah. Üniversite Cad. No:27, 34956 Tuzla/Istanbul (TR). OZYEGIN ÜNİVERSİTESİ [TR/TR]; Nisantep Mah. Oman Sokak No:34-36, Cekmekoy/Istanbul (TR).

(72) Inventors: KOSAR, Ali; Sabanci Üniversitesi, Orta Mah. Üniversite Cad. No:27, 34956 Tuzla/Istanbul (TR). SENDER, Kursat; Sabanci Üniversitesi, Orta Mah. Üniversite Cad. No:27, 34956 Tuzla/Istanbul (TR). MENGÜÇ, Mustafa Pinar; Ozyegin Üniversitesi, Nisantep Mah. Orman Sokak No:34-36, Cekmekoy/Istanbul (TR).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA,

(84) Designated States kind of regional protection available: GM, KE, LR, LS, TZ, UG, ZM, ZW, TJ, TM, Europe: DK, EE, ES, FI, LV, MC, MK, MT, SM, TR), OAPI: GW, KM, ML, M

Published:

— with international



Patent by
Koşar, Şendur, Mengüç
April 27, 2017

(54) Title: FLOW SYSTEM FOR AVOIDING PARTICLE AGGLOMERATION

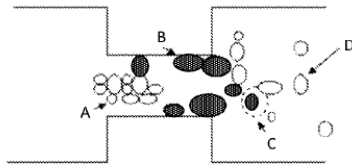


Fig. 1

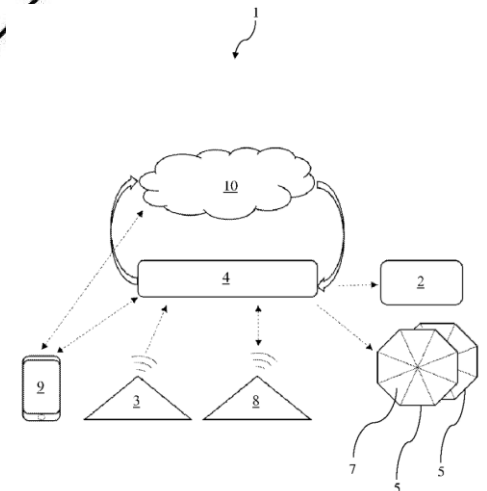
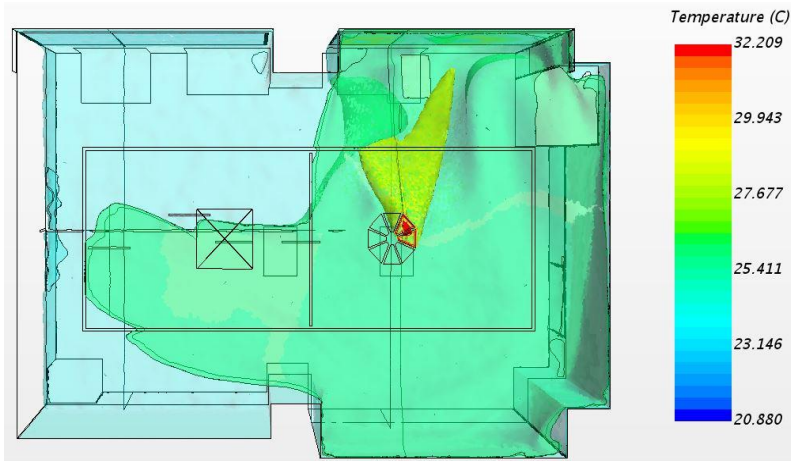
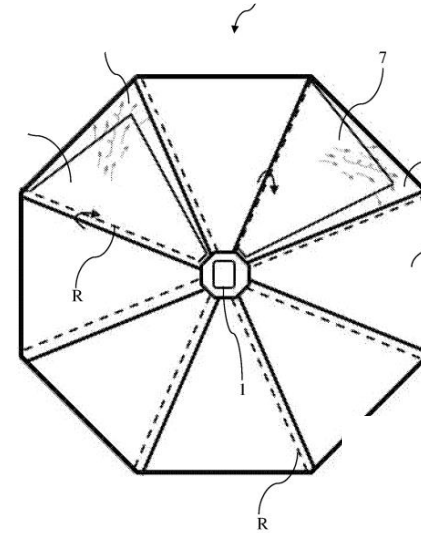
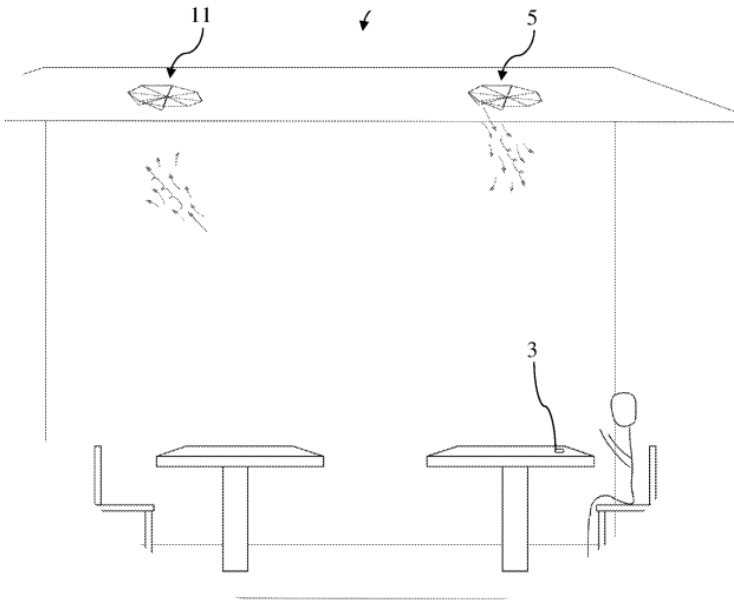
(57) Abstract: The present invention proposes a flow system for avoiding particle agglomeration in nanofluids, comprising a flow restrictive element which in use provides sudden expansion to the fluid such that cavitation takes place in the fluid upon exiting the flow restrictive element.

Japonya, Avrupa Birliği, ABD, TR

TRIADIK (ÜÇLÜ) PATENT

YENİ TÜR HAVALANDIRMA/ISITMA SİSTEMİ

Patent application by
Cem Keskin and M.P. Mengüç
2019

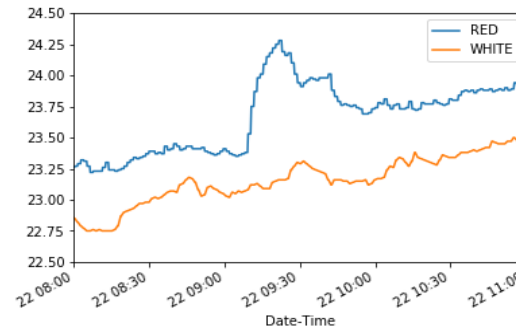


YENİ TÜR HAVALANDIRMA/ISITMA SİSTEMİ

Thermal Agents

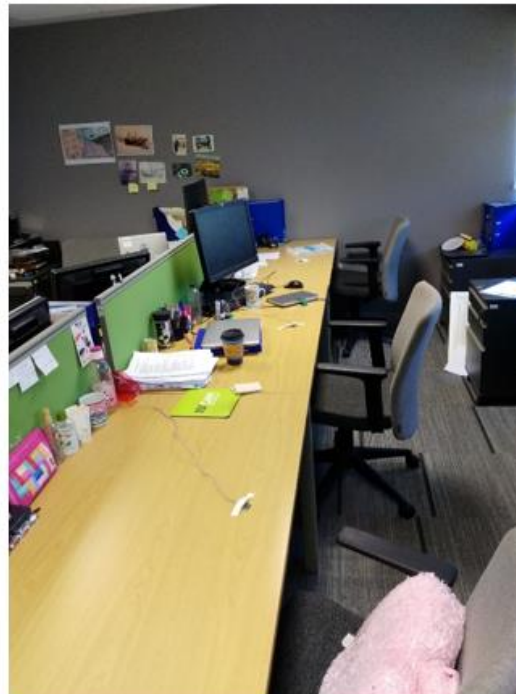
Manually controlled
4-way air diffuser

4-way fixed
air outlet



Manually controlled
4-way air diffuser

Patent application by
Cem Keskin and M.P. Mengüç
2019





CEEE/EÇEM @ OzU

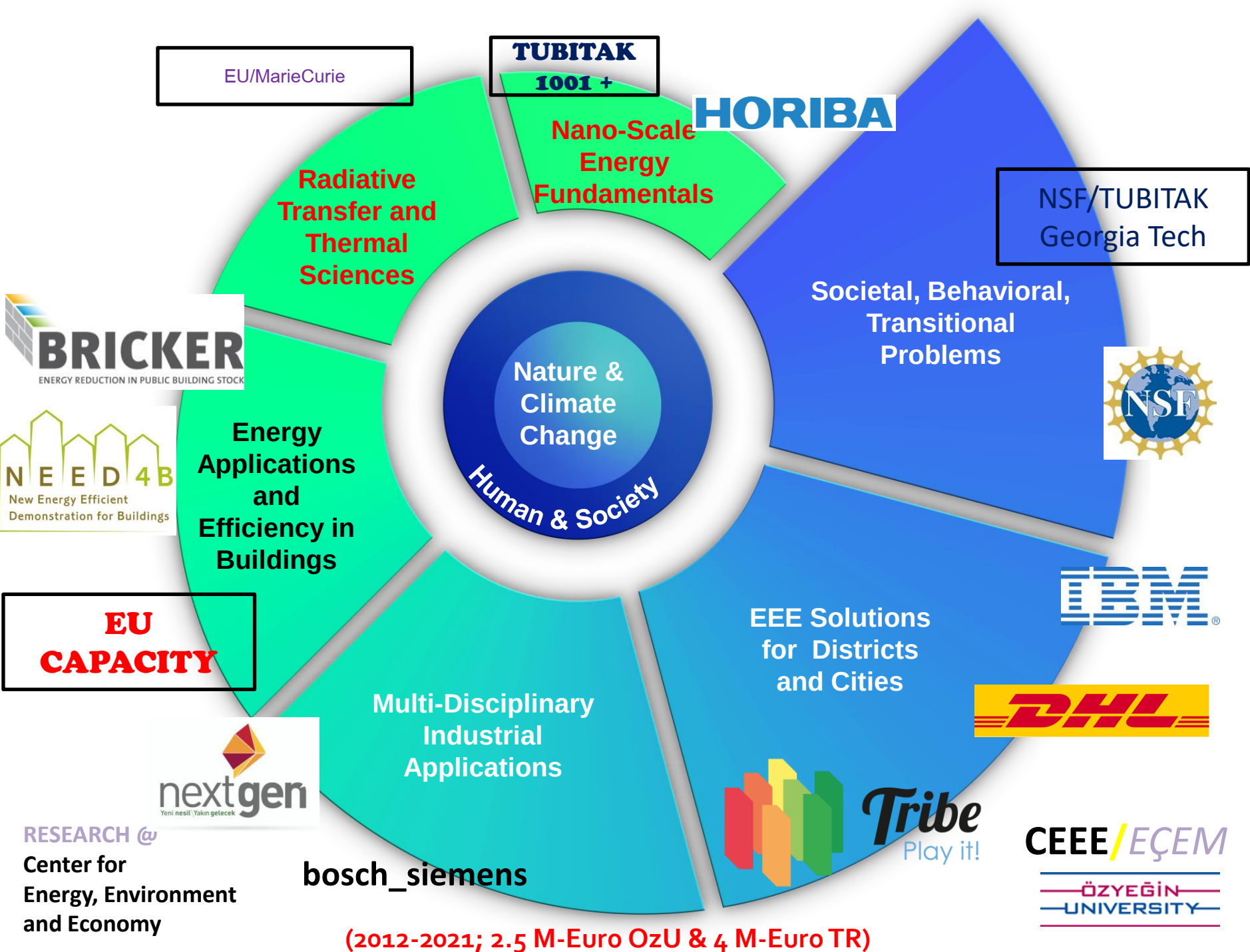
İKLİM KRİZİ'NİN ETKİLERİNİ AZALTMAK ANCAK...

DİSPLİNLER-ARASI & DİSİPLİNLER-ÖTESİ

ÇALIŞMALARLA MÜMKÜN OLACAKTIR.

**BÜYÜK DÜŞÜNÜP BİNALARA VE ŞEHİRLERE
KADAR GİTMELİYİZ.**

**SADECE MÜHENDİSLİĞE DEĞİL, PSİKOLOJİYE,
SOSYOLOJİYE, MİMARİYE, EĞİTİME ÖNEM VERMEMİZ
GEREKMEKTE....**



ENTEĞRE MİMARLIK VE MÜHENDİSLİK ÖZÜ SCOLA



AB-FP7-NEED4B projesi

Ozyegin Universitesi Kampusu.

Enerji Yoğunluğu: **44** kWh/m²/yıl.

Türkiye'deki tipik bir binada ise:
255 kWh/m²/yıl (İstanbul gibi)

Kampus'taki en iyi binaya göre

**YILDA 200,000 DOLAR AZ ENERJİ MASRAFI
VAR**



ENERJİ VERİMLİLİĞİNDEN İKLİM DEĞİŞİKLİĞİNE



- OzU KAMPUS; SCOLA BİNASI
- **BİRİNCİLİK** @ ENERJİ ve TABİİ KAYNAKLAR BAKANLIĞI ve İSTANBUL SANAYİ ODASI
- **BİRİNCİLİK** @ SANAYİ VE TEKNOLOJİ BAKANLIĞI



Doktora Öğrencileri:

Gökçe Ersel

Canan Özsoy

Sona Rahmian

İrem Kurtuluş (İTÜ ile)

+ Cem Keskin (PhD, 2020, OzU)

EÇEM ÖDÜLLERİ (2019-2021)

2018

NEED4B Project
Ministry of Industry and
Technology Efficiency
Awards, First Place,
Public Field



CAPACITY Project
IMSAD Future
Investment Award,
First Place
Social Field

NEED4B Project
Istanbul Chamber
of Industry, Energy
Efficiency Awards,
Special Category,
First Place



BRICKER Project
IMSAD Future
Investment Award
Economy Field

BRICKER Project
TÜBİTAK EU 7th
Framework Programme
for Encouraging
Participation Award



NEED4B Project
TÜBİTAK EU 7th Framework
Programme for Encouraging
Participation Award

2019

Purdue University
Outstanding Mechanical
Engineer Award
M. Pinar Mengiç

Istanbul International
Invention Competition
/ ISIF'20
Patent Award for "Adaptive
Vent System For Localized And
Personalized Thermal Comfort"
Cem Keskin & M. Pinar Mengiç
Silver Medal

Triadic Patent
Achievement
"Flow System For Avoiding Particle
Agglomeration", patented in USA, EU,
Japan, All Korea, Korea, Saudi,
M. Pinar Mengiç



NEXT-GEN Project
2020 Asia-Pacific Triple
E Awards; Community
Engagement Initiative
of the Year Mention
Award



NEXT-GEN Project
IMSAD Future
Investment Award
First Place
Social Impact

2020

2021

OzU ve YEŞİL MUTABAKAT (2021-2022)

ÖZYEGİN
ÜNİVERSİTESİ

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Yeşil Büyüme Odaklı İş Fikrine 200bin TL BİGG Desteği

TEMATİK ALANLAR



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Döngüsel Ekonomi



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Güvenli Enerji Arzı



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Sürdürülebilir Tarım



Sürdürülebilir
Akıllı Ulaşım



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Çevre ve Biyoçeşitlilik

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- + Cost Action Üyeliği
- + Cost Action Başvurusu

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ÜNİVERSİTESİ

BİGG
BİREYSEL GENÇ GİRİŞİM

girişimfabrikası

Yeşil Büyüme Çağrısı Baş Danışmanımız



Prof. Dr. Pinar Mengüç

Enerji, Çevre ve Ekonomi
Merkezi (EÇEM) Direktörü

 Başvuru: bigg.girisimfabrikasi.com

TEMATİK ALANLAR



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Döngüsel Ekonomi



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Güvenli Enerji Arzı



Yeşil ve
Sürdürülebilir Tarım



Sürdürülebilir
Akıllı Ulaşım



İklim Değişikliği,
Çevre ve Biyoçeşitlilik



CENTER FOR ENERGY, ENVIRONMENT AND ECONOMY
FROM NANO TO GIGA
RESEARCH AND APPLICATIONS



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