



Participant Profile

for the
Turkish-German Strategy Workshop 2006
TÜBİTAK Marmara Research Center
Gebze, Turkey
13 – 15 December 2006



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of the Federal Ministry of
Education and Research
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1. Contact details and personal information

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¹ **Role/function** e.g. working group leader, managing director, postdoc, PhD etc.

² **Organisation type** e.g. university, research institution, small and medium enterprise (SME), industry etc.

Working Group:	<input checked="" type="checkbox"/> 1 Material Technologies <input type="checkbox"/> 2 Biotechnology, Genomics and Food <input checked="" type="checkbox"/> 3 Energy <input type="checkbox"/> 4 Information and Communication Technologies <input type="checkbox"/> 5 Environmental Protection, Climate Change and Sustainable Development
Areas of activity:	<input checked="" type="checkbox"/> research <input type="checkbox"/> technology development <input type="checkbox"/> demonstration <input type="checkbox"/> training <input type="checkbox"/> dissemination <input type="checkbox"/> other:
Keywords characterising your area of research:	Please choose the appropriate key words (max. 5) from the following list: http://www.cordis.lu/fp6/keywords Applied physics, Optics, Optoelectronics, Physics of semiconductors, Optical and dielectric properties
Expertise, technologies and infrastructures available in your institution:	Research activities / expertise: dark and light transport properties of photovoltaic thin films and devices Methods: Dual beam photoconductivity (DBP) method, steady-state photocarrier grating method, dark and photoconductivity, Key technologies: HWCVD and PECVD thin film technologies Infrastructures: Impedance spectroscopy, closed cycle cryostat system, Liquid nitrogen cryostat system (77K-475K), Monochromator system New systems will be set from the new proposed research project. Key publications: 1- S. Lee, M. Güneş , C. R. Wronski, N. Maley, and M. Bennett, "Effects of midgap states in intrinsic hydrogenated amorphous silicon on sub-bandgap photoconductivity," <i>Appl. Phys. Lett.</i> 59 , 1578(1991). 2- Mehmet Güneş and Christopher R. Wronski, "Differences between light induced and native midgap states in intrinsic hydrogenated amorphous silicon obtained from detailed modeling of photoconductivity and sub-bandgap absorption," <i>Appl. Phys. Lett.</i> 61 , 678(1992). 3- Y. Lu, I. An, M. Güneş , M. Wakagi, C. R. Wronski, and R.W.Collins, "Nucleation and growth of hydrogenated amorphous silicon-carbon alloys: effects of hydrogen dilution in plasma-enhanced chemical vapor



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4- R. M. Dawson, C. M. Fortmann, **M. Güneş** ,Y. M. Li, S.S. Nag, R.W. Collins, and C.R. Wronski, "Effects of microstructure on transport properties of undoped hydrogenated amorphous silicon films," *Appl. Phys. Lett.* **63**, 955(1993).

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7- **Mehmet Güneş** and Christopher R. Wronski, "Differences between the densities of the charged defect states and kinetics of the Staebler-Wronski effect in non-intrinsic(undoped) hydrogenated amorphous silicon thin films," *J. Appl. Phys.*, **81**, 3526-3536 (1997).

8- **Mehmet Güneş**, R. E. Johanson, and S.O. Kasap "1/f Noise Study in Undoped Intrinsic Hydrogenated Amorphous Silicon Thin Films" *Phys. Rev. B* **60**, p.1477, 1999.

9- **Mehmet Güneş**, R. E. Johanson, and S.O. Kasap " Conductance fluctuations in undoped intrinsic hydrogenated amorphous silicon thin films prepared using different deposition techniques" *J. Non-Cryst. Solids*, Vol. **266-269** (1-3), p. 304-308 (2000).

10- Robert E. Johanson, **Mehmet Güneş** and S.O. Kasap, "1/f Noise in doped and undoped amorphous silicon" *J. Non-Cryst. Solids*, **266-269** (1-3), p. 242-246 (2000).

11- **Mehmet Güneş**, R. E. Johanson, and S.O. Kasap, Jeffrey C. Yang and Subhendu Guha, "Conductance fluctuations in undoped hydrogenated amorphous silicon-germanium alloy thin films" *J. Non-Cryst. Solids*, **299-302**, p.425 (2002)

12- Robert E. Johanson, **Mehmet Güneş**, and S. O. Kasap "Noise in hydrogenated amorphous silicon (review paper)" *IEE Proc.- Devices, Circuits, and Systems*, vol **149**, p.68 (2002).

13- **Mehmet Güneş**, R.E. Johanson, S.O. Kasap, F. Finger, A. Lambertz,"Conductance fluctuations in VHF-PECVD grown hydrogenated microcrystalline silicon thin films" *Journal of Material Science:Materials in Electronics*, vol.14, p. 731 (2003).

14- F. Finger, R. Carius, T. Dylla, S. Klein, S. Okur, **Mehmet**



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16- S.O. Kasap, **Mehmet Günes**, R.E. Johanson, Q. Wang, J. Yang, S. Guha, "Conductance fluctuations in a-Si:H: effects of alloying and device structure, *Journal of Material Science: Materials in Electronics*, vol.14, p. 693 (2003).

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18- S.Okur, **M.Günes**, O. Goktas, F. Finger, R. Carius, "Electronic transport properties of microcrystalline silicon thin films prepared with VHF-PECVD", *Journal of Material Science: Materials in Electronics*, vol.15, p. 183 (2004).

19. M. Güneş, O. Gökteş, S. Okur, N. Işık, R. Carius, J. Klomfass, F. Finger, "Sub-bandgap absorption spectroscopy and minority carrier transport properties of hydrogenated microcrystalline silicon thin films", *Journal of Optoelectronics and Advanced Materials*, vol.7, p.161(2005).

20. S. Okur, O. Gökteş, **M. Güneş**, F. Finger, R. Carius, "Minority carrier properties of microcrystalline silicon thin films grown by HW-CVD and VHF-PECVD techniques", *Journal of Optoelectronics and Advanced Materials*, vol.7, p.491 (2005).

21. F. Finger, R. Carius, T. Dylla, S. Klein, S. Okur and **M. Günes**, "Instability phenomena in microcrystalline silicon films" *Journal of Optoelectronics and Advanced Materials*, vol.7, p.83 (2005).

22. P. Ozdag, E. Atanassova, **M.Gunes**, "The effects of oxide thickness on the interface properties of metal-tantalum pentoxide-Si capacitors" *Journal of Optoelectronics and Advanced Materials*, vol.7, p.293 (2005).

23. M. E. Dönertaş and **M Güneş**, "Light induced degradation of hydrogenated amorphous-silicon germanium alloy (a-SiGe:H) thin films" *Journal of Optoelectronics and Advanced Materials*, vol.7, p.503 (2005).

24- O. Goktas, N.Işık, S. Okur, M. Gunes, R. Carius, J. Klomfass, F. Finger "Sub-bandgap Optical Absorption Spectroscopy of Hydrogenated Microcrystalline Silicon Thin Films Prepared Using Hot-Wire CVD (Cat-CVD) Process" *Thin Solid Films*, vol.501, p.121(2006).



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25- Okur, M. Güneş, F. Finger, R. Carius, “Diffusion Length Measurements of Microcrystalline Silicon Thin Films Prepared by Hot-Wire/Catalytic Chemical Vapor Deposition (HW-CVD)” Thin Solid Films, vol.501, p.137(2006)



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2. Past and present research collaborations

Are you familiar with the European Framework Programme?

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
<input type="checkbox"/> with Framework Programme 5 <input checked="" type="checkbox"/> with Framework Programme 6 <input type="checkbox"/> with Framework Programme 7	

EU-projects you are involved in:

Past projects
Present projects

Programme title / contract number / title / acronym / your function (coordinator / partner / contractor)
Gap state spectroscopy in microcrystalline silicon supported by TUBITAK and the BMBF of Germany
Investigation of instability issues in microcrystalline silicon thin films, just submitted to TUBITAK.

Other international collaborations:

1. Principal investigator of joint project with Dr.F.Finger of IPV, Research Center Julich, Germany supported by TUBITAK and the BMBF of Germany (April 2001- April 2006)
2. Principal investigator, 1/f noise investigations in amorphous and microcrystalline silicon thin films\ with Prof. S.O. Kasap, University of Saskatchewan, Canada.

Name(s) and contact details of potential partners:

If you would like to suggest the participation of particular partners from the partner country based on existing contacts or collaboration experience, you are welcome to indicate their names and contact details below:
Dr. F. Finger and Dr. R. Carius of IPV of Research Center Julich and Dr. R. Bruggemann of University of Oldenburg in Germany

3. Presentation at the Workshop

I will give a presentation at the workshop (approx. 10 min.) to present my institution, my expertise, and my collaboration interests. The contents of my presentations is summarised below (max. 1 page).

<p>I like to present recent investigations carried out during our joint project supported by TUBITAK and the BMBF of Germany. It is about fundamental dark and light transport properties of intrinsic microcrystalline silicon thin films prepared using HWCVD and VHF-PECVD deposition methods. Thin films with mixed microstructure exhibit wide range of electronic and optical properties which finally affect the optoelectronic devices fabricated from these films such as solar cells and detectors. Thin films were characterized by photothermal deflection spectroscopy, dual beam photoconductivity, steady-state photoconductivity, steady state photocarrier grating method, dark and photoconductivity, and 1/f electronic noise techniques. Reliable absolute absorption coefficient spectrum of films between 0.6 eV and 2.5 eV was measured using different methods and magnitude of absorption coefficients at low energies was correlated with the level of electronic defect present in the bandgap of the material. The crystalline to amorphous volume fractions and electronic properties were correlated for films deposited by both systems. The samples exposed to air after deposition show wide range of instability effect that both dark and light transport properties change substantially. Dark ESR, dark conductivity and electronic noise experiments has been recently used to understand the nature of instability issues due to exposure to atmospheric gasses. The investigation has been in process and new joint project is about to be submitted to corresponding Institutions in Turkey and in Germany. This new joint project will be among Mugla University of Turkey, Oldenburg University and Institute of Photovoltaics, Research Center Julich in Germany. Detailed investigation of instability issues in microcrystalline silicon thin films will be carried out using several different experimental techniques in three different Institutions.</p>
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I agree with the publication of my data on the Workshop website!



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