



Participant Profile

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



International Bureau (IB)
of the Federal Ministry of
Education and Research
(BMBF)

**Expertise,
technologies and
infrastructures
available in your
institution:**

Research activities / expertise: Development and demonstration of innovative chip-scale quantum optoelectronic devices and sensors with embedded micro and nano structures for the applications of switching, computing, communications, and sensing.

Methods: Epitaxial growth, micro and nano fabrication, optoelectronic characterization

Key technologies: Quantum structures, photonic devices

Infrastructures: Cleanroom fabrication facility, optical characterization facility, electrical characterization facility

Key publications:

H. V. Demir, H. Koklu, M. B. Yairi, J. S. Harris, Jr., and D. A. B. Miller, "Optoelectronic switches based on diffusive conduction," *Journal of Applied Physics* (2006).

O. Fidaner, **H. V. Demir**, V. A. Sabnis, J.-F. Zheng, J. S. Harris, Jr., and D. A. B. Miller, and J.-F. Zheng, "Integrated Photonic Switches for Nanosecond Packet-Switched Optical Wavelength Conversion," *OSA Optics Express*, 14(1), pp. 362-368 (2006).

H. V. Demir, V. A. Sabnis, O. Fidaner, J. S. Harris, Jr., D. A. B. Miller, and J.-F. Zheng, "Multifunctional integrated photonic switches," *IEEE Journal of Selected Topics in Quantum Electronics*, 11(1), pp. 86-96 (2005).

H. V. Demir, V. A. Sabnis, J.-F. Zheng, O. Fidaner, J. S. Harris, Jr., and D. A. B. Miller, "Scalable wavelength-converting crossbar switches," *IEEE Photonics Technology Letters*, 16(10), pp. 2305-2307 (2004).



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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 checked="" type="checkbox"/> with Framework Programme 7	

EU-projects you are involved in:
Past projects

Programme title / contract number / title / acronym / your function (coordinator / partner / contractor)

Present projects

1. EU FP6 511616 Network of Excellence on nanophotonics PHOREMOST Joint Research Program 1 (JRP1) Deputy Leader, Nanocrystal-embedded Microdevices Task Leader
 2. EU FP6 021391 Marie Curie IRG MOON Modern Optoelectronics on III-N Coordinator

Other international collaborations:

Stanford University and University of California, USA

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:

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).

Hybrid Nanophotonic Devices and Systems for New Photonic Functions

Hilmi Volkan Demir

Nano material that is designed to confine electrons at nanometer scale in a controlled manner exhibits strong quantum effects in the photon-electron interactions at room temperature, leading to extraordinary optical absorption and emission properties. Incorporation of such quantum-confined structures into photonic devices and systems enables the realization of new functionalities including optical emission, modulation, switching, wavelength conversion, scintillation, and photocatalysis that are controlled favorably with different external optical and electrical effects.

In our research group at Bilkent University Nanotechnology Research Center, we work on the development of hybrid nanophotonic devices and systems that incorporate in-solution synthesized, grinded, and epitaxially grown nano structures for the applications of light generation, imaging, sensing, and communications in a wide spectral range that spans from the visible to the deep ultraviolet (UV).

In this talk, we will present examples of our hybrid devices and systems that incorporate AlGaIn/GaN and GaN/InGaIn quantum structures, CdSe/ZnS core-shell nanocrystals, and TiO2 nanoparticles. We will give an overview of our visible and UV sources for white light generation and detection of chemical and biological agents; scintillators for enhanced optical detection and imaging in the UV; visible (blue) and UV quantum modulators for optical clock injection and secure communications; and UV photocatalytic surfaces for self-cleaning and environmental chemical and biological decontamination.



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I agree with the publication of my data on the Workshop website!

PLEASE FILL IN THIS FORM **UNTIL 22 SEPT. 2006 AND RETURN IT TO:**

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