

## PLENARY TALK

### **Infrared transmitting silver halide fibers and their applications**

**Abraham Katzir**

School of Physics and Astronomy, Tel Aviv University, Israel

There is a wide interest in the development of optical fibers for the mid - IR (i.e. 3-30 $\mu$ m). AgClBr crystals are extruded in our laboratory to form fibers, which are flexible, non-toxic, non-hygroscopic and highly transparent in the mid-IR. These silver halide fibers have made it possible to carry out advanced research and development, which will be discussed in this talk:

- (1) Non - contact fiberoptic thermometry.
- (2) Laser power transmission through IR fibers (e.g. laser cutting or heating).
- (3) Laser bonding of tissues - clinical studies.
- (4) Fiberoptic evanescent wave spectroscopy and its applications:
  - a. Environmental protection (e.g. monitoring of pollution in water and soil).
  - b. Homeland Security (e.g. online monitoring of poisons in water).
  - c. Early diagnosis of diseases, such as cancer – clinical studies.
- (5) Doped AgClBr crystals and fibers for mid - IR amplifiers and lasers (e.g. countermeasures against shoulder launched missiles).
- (6) Near-field scanning mid-IR microscopy with a sub-wavelength resolution (e.g. the study of individual living cells or of individual components in integrated electronic circuits).

## **PLENARY TALK**

# **Israeli participation in the construction of the largest microscope in the world, the LHC**

**Giora Mikenberg**

Department of Particle Physics and Astrophysics, Weizmann Institute of Science, Israel

- (1) Introduction to the Israeli Educational System and its influence on the High-Tech revolution.
- (2) Israeli relations with CERN.
- (3) The Physics of the LHC.
- (4) The Largest Experiment in the World; ATLAS and the Israeli participation.
- (5) The discovery of the Higgs Boson.

## **PLENARY TALK**

### **Energy production from biomass, fuel production from waste, and fuel alternatives for transportation**

**Sinaia Netanyahu**

Chief Scientist, Ministry of Environmental Protection

Fuel is by far the number one commodity consumed in the world, and also the number one pollutant in the world. If we want to lessen the negative impact we have on the environment, we must find more sustainable ways to produce and consume fuel. One of the most developing markets in the world today is the development of alternative energy sources. It is crucial to develop sustainable energy sources from both environmental and economic points of view. There is little sense in harvesting sustainable solar and wind energy using non-sustainable technologies. The Ministry of Environmental Protection promotes research and regulation in the fields of fuel production from waste and fuel alternatives for transportation. The Ministry has supported research in these fields in the sum of 15 millions NIS in the last 5 years. The Ministry is also investing 40 million NIS in the establishment of a national academic waste management center, that will promote research in material management, waste treatment, waste prevention and more.

## PLENARY TALK

### **Electrically controlled molecular recognition harnessed to control cellular response – a step towards seamless fusion of biology with electronics**

**Uri Sivan**

Department of Physics and the Russell Berrie Nanotechnology Institute, Technion –  
Israel Institute of Technology, Haifa, Israel

Manmade electronics and living systems are foreign to each other in all aspects. They are constructed from dissimilar materials using different strategies, employ different charge carriers, and use distinctively different logics for their computation. The fusing of these two fields therefore poses major conceptual and practical challenges but at the same time holds a great promise to both electronics and healthcare. Learning a lesson from biology where functional interfaces are realized through mutual recognition of two molecules we propose and demonstrate a generic bio-electronic synapse comprising a manmade electronic device having two states and engineered T-cells expressing receptors that bind the device exclusively in its "on" state. Application of  $-0.6\text{V}$  to the device sets it to its "off" state where the cells remain unbound and inactivated. Subsequent application of  $+0.6\text{V}$  to the device sets it to its "on" state where cells recognize it and as a result bind and trigger their immune response. The talk will cover conceptual and practical issues associated with the realization of this first link between electronics and biology as well as details of the bio-selection process that led to the isolation of the specific T-cell receptors and the unexpected underlying recognition mechanism.