

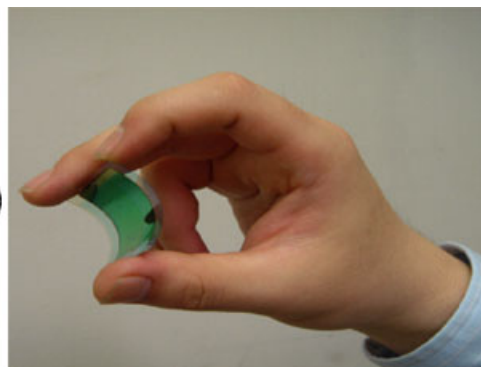
1. Organic Photovoltaics (OPVs)

Sunlight is a clean and inexhaustible source of energy, and its effective use will go a long way towards diminishing the green house effect. Solar Cells, or Photovoltaics (PVs) are a proven technology in capturing and reusing sunlight for energy, but the cost of generating power-with the silicon PVs currently in use is still very high. Reducing these costs is a must if we are to promote greater use of PVs. Thankfully, the new OPVs should make this possible.

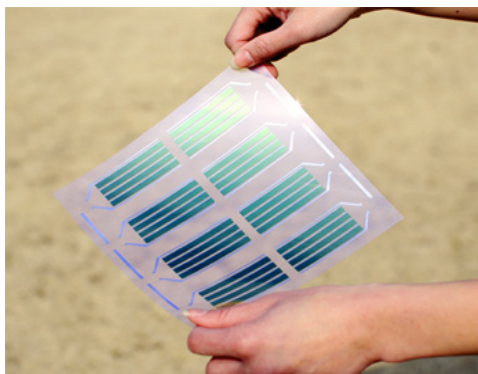
A great deal of time and research has gone into the development of OPVs. A recent breakthrough was made in sunlight conversion, when it was discovered that C60 fullerene has very good organic semi-conductivity and can be effectively applied to the OPV module as an acceptor. Frontier Carbon Corporation (FCC), an MC subsidiary and the world's largest producer of fullerene, is supplying the C60 used in the module's production.



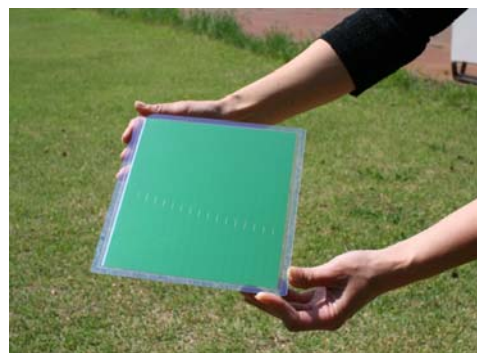
Silicone PV



OPV film module



Conventional patterning



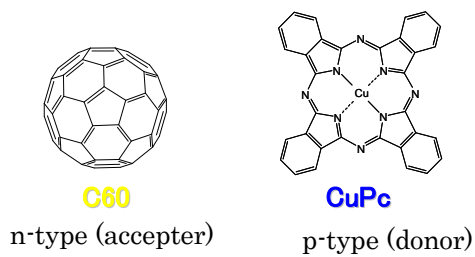
Highly integrated module by Laser scribing

2. OPV Mechanism

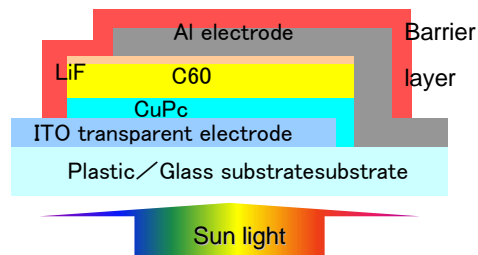
Like silicon PVs, OPVs employ a P-N diode junction as a generating active layer. The biggest challenge over some 30 plus years of R&D has been raising the low power output of PVs. In January, 2005, AIST achieved 4.0% light exchange efficiency with the introduction of a bulk-hetero junction (i-layer). At the time, this was the highest efficiency rate that had ever been achieved.

In a new, highly integrated OPV module, fullerene (C60) from FCC is used as a n-type of semiconductor (accepter) and Phthalocyanine (CuPc) as a p-type of semiconductor (donor).

<Organic semiconductor for OPV>



<Structure of OPV>



<Foliage type module>

3 . About AIST

- Institute name: National Institute for Advanced Industrial Science and Technology
- President: Tamotsu Nomakuchi
- Location: 1-1-1 Umezono, Tsukuba City, Ibaraki prefecture
- Number of researchers: 2,348 (As of 4/1/2009)
- Research Areas: Nanotechnology, Material, IT, environment, energy, etc.

AIST has its own Research Center for Photovoltaics (RCPV) that was set up in 2004. RCPV is dedicated to comprehensive research on Photovoltaics, from materials to large-scale systems design or characterization. The center consists of six teams, including the Advanced Organic Material Team (AOM). The AOM has already made some significant achievements in OPVs.

4 . About TOKKI

- Company name: Tokki Corporation
- President and CEO: Teruhisa Tsugam
- Location: Hatchobori 2-chome 21-2, Chuo-ku, Tokyo
- Number of Employees: 185 combined; 161 direct (as of December 2008)
- Date Established: July 29th, 1967
- Main Businesses: Development, manufacturing, and sale of vacuum technology products
- Stock Capitalization (Start-Up Cost): 6,572,646,400 yen (JPY)

TOKKI is one of the world's most notable producers of vacuum technology products, and the principle manufacturer of machinery for organic electro-luminescence (OLED) displays. In December 2006, TOKKI introduced OPV manufacturing machinery, which has sequential processing from material to barrier deposition.