



BY RICK NELSON, EDITOR-IN-CHIEF

Tech innovation addresses societal, environmental challenges worldwide

Intensive research and development in nanoelectronics and nanotechnology is critical for tackling societal and environmental challenges facing the world today. Speaking at the IMEC (www.imec.be) ARRM (Annual Research Review Meeting) on Oct 13, in Leuven, Belgium, Luc Van den hove, executive vice president and chief operating officer at IMEC, outlined several areas of concentration that the independent research center is addressing in conjunction with its partners.

Two major areas, he said, are health care and energy.

Health care is particularly ripe for innovations that can provide increased levels of care at lower costs. Today, Van den hove said, blood analysis is a labor-intensive process that can take a couple of days. In the future, he added, a “lab on a chip” will be able to promptly, accurately, and inexpensively provide results. Going further, he said, in-body and wearable sensors—powered by energy-harvesting techniques—will provide early warnings of potential health problems.

In separate presentations, IMEC personnel said that the organization should be well-positioned to address health-care issues. Kris Verstreken, program director of biomedical electronics, said the cell is the most complex MEMS (microelectromechanical) device you can imagine, combining electrical, chemical, and mechanical functions in a nanoscale dynamic environment. IMEC’s nanotechnology, he added, operates at the same scale and paves the way for various health-related applications, including deep-brain stimulation for treatment of Parkinson’s disease, epilepsy,

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and obsessive-compulsive disorder, as well as metal nanoparticle hyperthermia for cancer treatment.

Bert Gyselinckx, program director for wireless-autonomous-transducer solutions at IMEC, demonstrated an emotion-monitoring body-area network system that could have applications in reducing stress and increasing task engagement. Carmen Bartic, who coordinates the research activities of the Bioelectronic Systems Group at IMEC, described cell-to-electronics interfaces that could result in implantable probes that combine stimulus and recording capabilities, and Chris Van Hoof, program director for integrated systems and smart implants, provided detail on implantable neuroprobes.

As for energy, Van den hove noted that the sun provides 165,000 TW

of free solar power. Researchers need only to find a way to capture, store, and transform solar energy in an environmentally friendly manner. As an approach to solving the problem, he cited thin-wafer silicon solar cells that enable such innovations—from IMEC spin-off Photovoltaic—as building-integrated solar facades.

Jef Poortmans, director of the solar and organic-technologies department at IMEC, elaborated on the challenges facing the adoption of solar technology. Today, he said, photovoltaic panels are not competitive without government subsidy. Efforts to wring costs from photovoltaic installations center on minimizing the grams of silicon required per watt-peak, which IMEC is working to accomplish by minimizing wafer loss, reducing active-layer thickness, and increasing efficiencies beyond 20%. Such efforts could help meet European goals of installing 400 GW of peak solar capacity by 2020, accounting for 12% of the continent’s energy supply.

Although based in Belgium, IMEC works with partners worldwide to help develop and deploy advanced semiconductor technology. Such cooperative efforts will become increasingly important as technology advances and R&D becomes ever more costly. Particularly in times of economic stress, it makes sense for companies to cooperate on precompetitive research, as IMEC President and Chief Executive Officer Gilbert Declerck suggested during his ARRM presentation.

But that’s not to say innovation can’t happen on a smaller scale. Published with this issue of *EDN* is *EDN Global Innovators 2008*, which highlights how technological innovation occurs across the gamut of organizational environments—from start-up fabless-semiconductor companies to large automotive manufacturers. Read more at edn.com/global08. **EDN**

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