

Title:

Semiconductor Thin-Film Transfer Technology has Finally Arrived

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Abstract:

For years, lattice mismatched hetero-epitaxy has been regarded as the correct approach for heterogeneous integration, but the mismatch led to material quality problems. At around the same time a competing approach, thin-film epitaxial layer transfer began to be developed, but the handling of free-standing thin films was a primitive art. Over the period of decades the discipline of processing free-standing thin films has steadily improved, now becoming a routine commercial technology in photovoltaics, LED's, SOI, and other semiconductor devices. In this talk, I will review the mechanical discipline that has been learned for handling free-standing semiconductor films, and speculate on future applications of this materials technology.

Biography:

Eli Yablonovitch is Director of the NSF Center for Energy Efficient Electronics Science (E³S), a multi-University Center headquartered at Berkeley.

Yablonovitch introduced the idea that strained semiconductor lasers could have superior performance due to reduced valence band (hole) effective mass. With almost every human interaction with the internet, optical telecommunication occurs by strained semiconductor lasers.

In his photovoltaic research, Yablonovitch introduced the $4(n^2)$ ("Yablonovitch Limit") light-trapping factor that is in worldwide use, for almost all commercial solar panels.

His mantra that "a great solar cell also needs to be a great LED", is the basis of the world record solar cells: single-junction 28.8% efficiency; dual-junction 31.5%; quadruple-junction 38.8% efficiency; all at 1 sun.

He is regarded as a Father of the Photonic BandGap concept, and he coined the term "Photonic Crystal". The geometrical structure of the first experimentally realized Photonic bandgap, is sometimes called "Yablonovite".

His startup company Ethertronics Inc., has shipped over 1.7 billion cellphone antennas.

He is a Co-Founder of Luxtera Inc., the world leader in Silicon Photonics.

He has been elected to the NAE, the NAS, and as Foreign Member, UK Royal Society. Among his honors is the IEEE Edison Medal, the Buckley Prize of the American Physical Society, and the Isaac Newton Medal of the UK Institute of Physics.

