SOLAR CELL WAVE GUIDES

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The solar cell wave guide takes advantage of a recent discovery called extraordinary optical transmission[1]. The solar cell wave guide is an undeveloped concept needing research and development. It is not (to the best of my knowledge) patented, and this paper makes the concept patent free. The solar cell wave guide focuses on maximizing the absorption of quanta from the infrared spectrum. Three potential uses are: the use of firelight to charge smart phones, powering equipment on a planet like Venus, maximizing the heating of solar water heaters. April 5, 2013

The solar cell wave guide is a result of 'The Ultra-Space Field Theory'. For an easy-read understanding of the Ultra-Space Field Theory check out 'The Treasure Hunter'- a sci-fi novel using the physics model, available at Kindle.

Extraordinary Optical Transmission

In 1998, while working at NEC Research Institute, T. W. Ebbesen, Peter Wolff, H. F. Ghaemi, Tineke Thio, D. E.; Grupp, and H. J. Lezec, discovered a major new optical phenomenon. They found that, contrary to the then accepted theory, it was possible to transmit light extremely efficiently through subwavelength holes milled in opaque metal films under certain conditions. 100 million identical holes were made in the foil, each hole 300 nanometers wide, or 200 times smaller than the diameter of a human hair.

Light as Transverse Waves

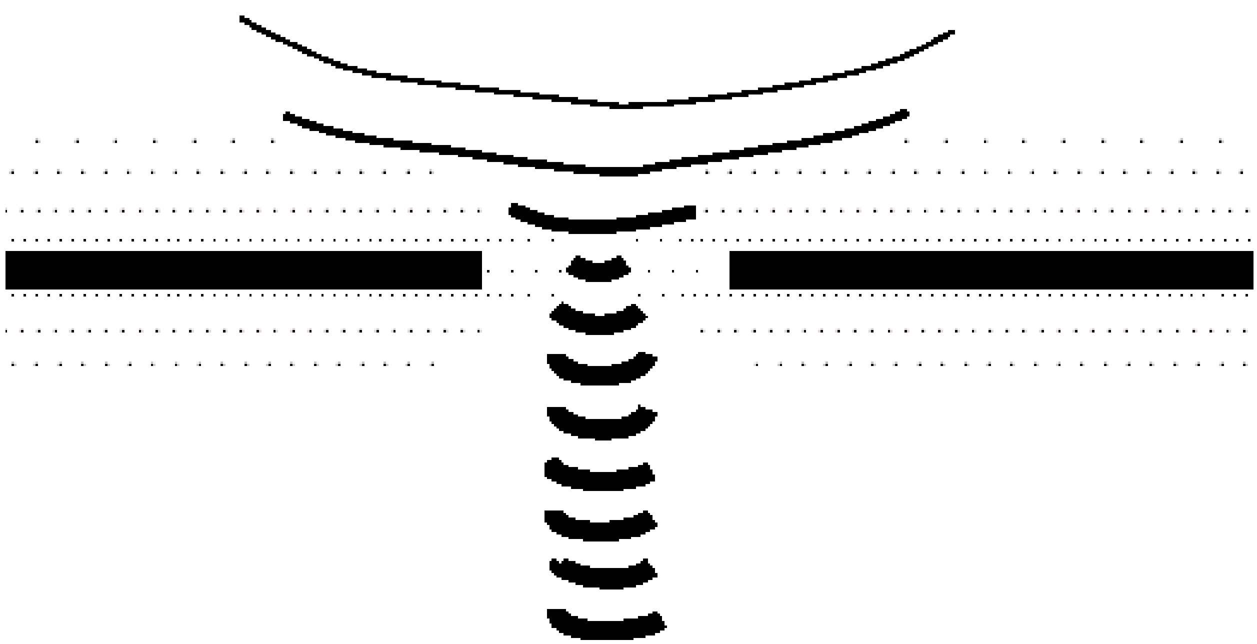
In this thesis, light is treated as longitudinal waves, with the ability of individual quanta (units of energy being transported from oscillator to oscillator, per Maxwell Planck) to transport polarization characteristics until interference distorts the pattern. The belief of light waves as transverse is considered to be a misinterpretation of the evidence.[2]

Plasmonics as a portion of the Electromagnetic Field

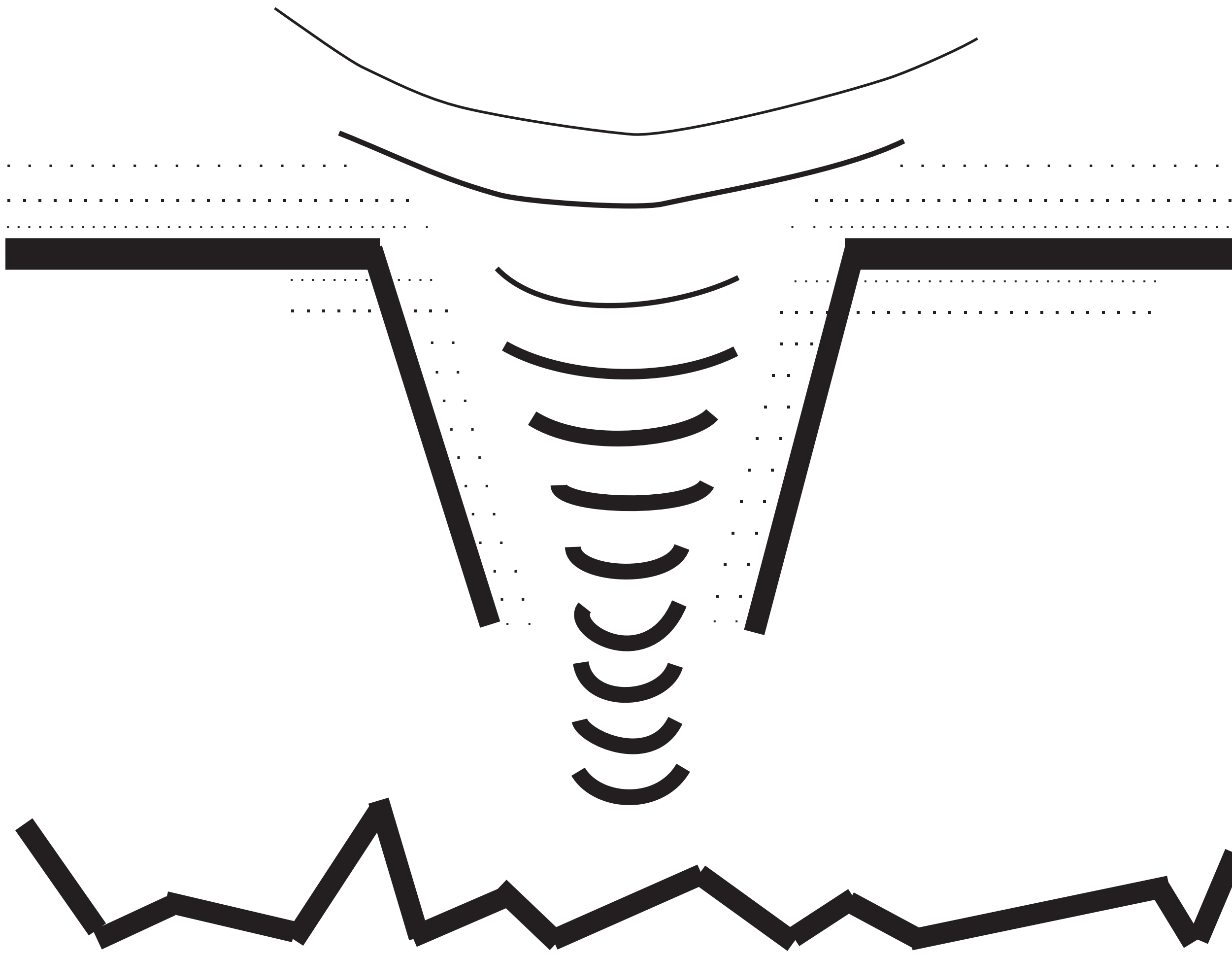
In a previous paper[3], plasmonics was described as a part of the electromagnetic field. Research and descriptions of the electromagnetic field are currently very unfashionable, and rarely used. Technicians use the terminology of EM waves all the time out of necessity (frequency, dispersion, interference), and academics combine EM wave terminology with photons on a regular basis.

Extraordinary Optical Transmission per an Electromagnetic Wave Model
Ebbesen & team used a photon model interacting with a plasmonic surface in explaining the phenomenon of EOT. This seems to have become the common model used in EOT investigations and is reductionistic in nature. For purposes of understanding, a model of the electromagnetic field transporting electromagnetic waves is more useful. It is common knowledge in physics light travels more slowly through air than in a vacuum, and more slowly through glass than through air. This suggests the the speed of light is a variable, becoming slower in denser mediums and faster in thinner, more rarefied mediums.

Applying the EM wave model to extraordinary optical transmission, we find light is traveling more quickly through the center of the nanohole where the metal foil's EM field is weakest. The density of the EM field condenses with proximity to the edge of the holes, meaning that light near the edges is moving more slowly than at the center. A form of lensing is taking place, with light literally being funneled by back pressure, towards and through the center of the hole, where resistance to movement is at a minimum. (In the Ultra-Space Field Theory it is the same sort of kinetic energy as in waves of water and the effect is similar).



In the above diagram, the metal foil's EM field is represented by the surrounding dots. The waves become more concentrated (intense) as they meet with less resistance at the center of the hole. Sound waves and even surface water waves behave the same way.



The above design uses a light as electromagnetic waves model. This model suggests a dimpling design, with the hole at the bottom of the dimple, to maximize the lensing effect. The solar device receiving light (visible and infrared) should be of a black material (black will absorb visible light, reradiating it as infrared). The solar device should also have an irregular surface, so as not to (or at least minimize) infrared reflection back out through the nanohole. Solar water heaters use black tubing, which should be adequate because of their roundness. The MIT carbon 'nanotube' solar cell is a new infrared solar cell which should be a good fit. UCLAs new plastic solar cell, 70 percent transparent and designed for infrared absorption might also be a good fit.

The solar cell wave guide is (theoretically) an aluminum (or some other reflective metal) box open on one side (for the solar device receiving energy). Aluminum is known for reflecting infrared, as well visible light. (Reflection is preferable to absorption and reradiation because energy will be lost through heat conduction and much of the reradiation will not contained, but lost as infrared on the outside of the solar cell wave guide.

One interesting possiblity is combining visible light solar cells with infrared. Small, visible light solar cells could be located immediately beneath the nanoholes, with infrared cells in the surrounding material.

References

[1]'Extraordinary Optical Transmission as an Electromagnetic Phenomenon' K. Foote @http://vixra.org/abs/1303.0138

[2] 'Ultra-Space Field Theory', K. Foote, Cosmos Books, Ann Arbor, 2005. (Available at Google Books.)'

[3] 'Plasmonics per the Ultra-Space Field Theory', K. Foote @http://vixra.org/abs/1302.0116