

Abstract Submitted
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Very high transmittance, back-illuminated, silicon-on-sapphire universal substrate for enabling a sustainable, closed clean energy cycle ALVIN G. STERN, AG STERN, LLC — A novel, very high transmittance, back-illuminated silicon-on-sapphire (SOS) substrate design enables 93.7 percent of the full AM 1.5 solar irradiance spectrum to be transmitted into the silicon semiconductor layer to enable photovoltaic (PV) light detectors that could also include advanced, multijunction, bandgap engineered device architectures, to operate at their maximum theoretical limits of efficiency. Very high energy conversion efficiency PV devices based on the novel SOS substrate can be utilized to provide sufficient small scale electric power to single family dwellings to allow them to permanently disconnect from the electric grid and municipal gas mains. Efficient electric power generation enabled by the novel substrate would also permit dedicated solar power plants to provide industrial scale electric power for chemical electrolysis to regenerate sodium metal (Na) that was reacted with water (H_2O) to produce sodium hydroxide (NaOH) and high purity hydrogen (H_2) fuel. Low cost, efficient generation of electric power enabled by the novel SOS substrate coupled with the near limitless availability of sodium (Na) metal in sea salt and a direct electrochemical means to extract it, would ensure a fully closed clean energy cycle.

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