



SIC MATERIAL PRESENTATION

International Offices

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SIC Facts...

Solar electricity: > double kWh for 50% cost, better quality

Batteries: 6-times storage capacity, same cost, better quality

High performance parts and tools: extremely hard, chemically resistant and neutral, long life, low cost

- ✚ This material is available for the production of pure Siliconcarbide (SiC) at very low cost. The pure SiC is produced from liquid silicon and liquid sugar - resources that are abundantly available on earth and partly renewable.
- ✚ The SiC business model is based on several applications of pure (SiC). Further developments are in the research pipeline.
- ✚ The applications included in the SiC business model are ready for industrial scale production. The referring R & D work is finished. The machines for industrial production are delivered and are operating reliably. Next step is the production of certified demonstrator units for marketing purposes.
- ✚ The first important application to be marketed is the battery technology. SiC Anodes instead of graphite Anodes increase the capacity of Lithium-Ion batteries by 500%. A Tesla with an E-motor can drive 1.800 km instead of 300 km or, a mobile phone Accu runs 6 days instead of 1 day.
- ✚ The battery technology is unchanged only the Anode material is different. Therefore, existing battery factories can produce the batteries. The SiC Anodes can be used for all kind of batteries from the smallest battery for watches to large Battery stations for utility purposes. The production cost per kWh of batteries with SiC Anodes are below 20% of batteries with graphite Anodes.
- ✚ The marketing will start with car batteries and utility storage units for renewable energy. Existing battery factories can be used for production. Therefore, huge production capacities are already existing. The same batteries are used for cars and utility storage units.
- ✚ The marketing of SiC photovoltaic mesh for repowering of existing solar power plants (field and roof top) will be begin. SiC photovoltaic mesh generates more than double the solar electricity compared to modern polycrystalline photovoltaic modules at less than half of the production cost. Furthermore, the quality is much better: no degradation, higher (instead of lower) performance in hot environment, easy recycling, half of the material based on renewable materials.

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Optimized Marketing Strategy

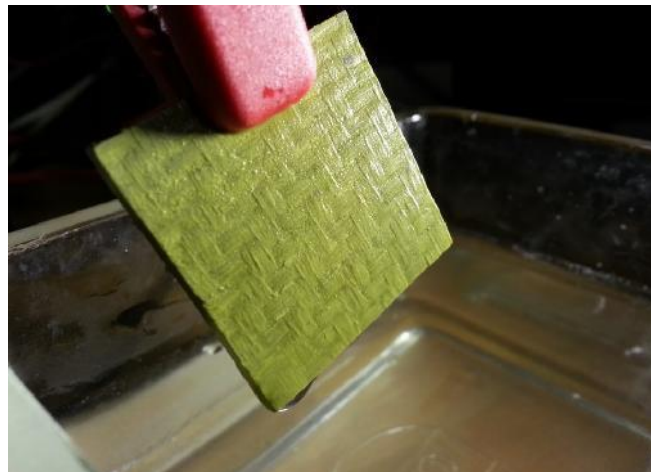
- ✚ The SIC applications – those developed until today and those to come in the future – will worldwide and fundamentally change the PV solar electricity industry, the battery industry and many other industry appliances as well.
- ✚ Therefore, the design of an adequate marketing strategy is crucial for a successful and sustainable roll out. Large industries will have to change dramatically and need to embrace SIC quickly to be part of the success story. Those who don't will suffer severe financial losses as the value of old technologies will drop quickly.
- ✚ The SIC management team is currently developing an adequate marketing strategy based on an analysis of the world markets, their future development, the worldwide competition and the relevant political and technical environment.

Preliminary Marketing Strategy

- ✚ ConverSIC: around 20 companies have already shown their interest in the tools and parts that can be produced via 3D printers and SIC- fibre mats. Therefore, these companies can immediately be provided with sufficient testing material. Subsequently, revenues from sale of material will follow quickly. The current monthly operational cost shall be covered by ConverSIC revenues.
- ✚ AnodeSIC: a demonstrator battery shall be developed in cooperation with the MEET department of the University of Münster, Germany. The MEET has a worldwide reputation for their knowledge of state of the art battery technology. SIC R&D and MEET will build and optimize a demonstrator battery for the automotive and utility storage customers. The development is supposed to take 4 to 6 months. The SIC Battery will be certified by the TÜV. During the certification period we will identify specific project applications.
- ✚ SolarSIC: the SIC photovoltaic mesh needs to be electrically adopted to PV-solar field and roof top appliances. The quickest approach to the market seems via repowering of existing PV plants as the existing plants can be further used as a base for the SIC appliance with relatively little technical changes, if combines with SIC utility storage batteries. Inverters and electrical system can be left nearly unchanged. The repowering technical development will be handled internally at IPV Energy.

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ConverSIC

- ✚ SIC tools and parts have been produced already and can be displayed to customers. Contacts to around 20 potential customers are in place.
- ✚ The production of ConverSIC material shall start immediately. The produced material will be given to a selection of potential customers for testing.
- ✚ The granulate can be used with 3D-printers for the production of high performance tools and parts. These parts are extremely hard (nearly as hard as diamonds), lighter than metal, fully chemically resistant and perfectly suitable for the food and cosmetic industry.
- ✚ ConverSIC can be rotated from being a perfect conductor to being a perfect isolator. Any combinations of such different rotations are possible. This is of high interest for the electric and electronic industry.
- ✚ Among the many possible appliances are: clean room tools for the semiconductor industry (pure SIC is chemically absolute clean) or as high effective material for isolation (electricity or radiation).
- ✚ Furthermore, SIC fiber mats can be used in industrial appliances for filter purposes or for the strengthening of materials and parts.
- ✚ The revenues from ConverSIC will cover all operating cost from start-up onwards.

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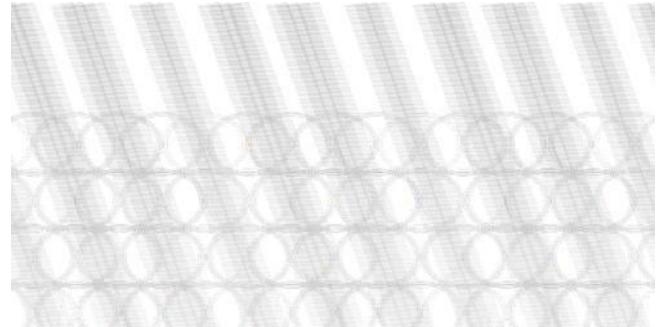
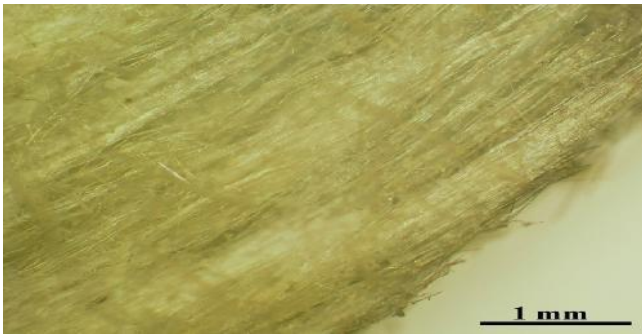
AnodeSIC

- ✚ A first SIC battery has been manufactured by the IPV Energy team. The battery functions and already displays the superior performance.
- ✚ However, the battery needs go through an optimization process including a suitable electrical management for use in the automotive and utility scale industry.
- ✚ This will be done in cooperation with the renown MEET Institute. The MEET has 150 experts and is leading in state of the art battery technology.
- ✚ The demonstrator battery for car and storage appliances is currently available with, TÜV certification within 6-months of the first manufacturing facility being completed.
- ✚ Current cost of batteries is around 200 Euro/kWh. The cost for a battery with a SIC anode is the same compared to a battery with SIC anode. However, the storage capacity is 6 times higher! Therefore, the price per kWh is reduced to 33 kWh.
- ✚ At a price of 27 Euro/kWh for the SIC anode granulate the price per kWh could go down from 200 to 60 Euro/kWh, which is only 30% of the current battery price.
- ✚ Additionally, the performance of a SIC anode battery is much better: longer life time, no loss of capacity during life time, no danger of chemical reactions.
- ✚ The low price combined with much better performance will lead to a high demand.
- ✚ Production cost for the SIC anode granulate is 12.50 Euro/kWh calculated at current cost. These cost will go down significantly at industrial scale production.
- ✚ The operational profit therefore is 14.50 Euro (116%) per kWh.

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- ✚ The world demand for batteries is estimated to reach 120,000,000 kWh in 2020 (Avicenne Energy Report). The future markets for automotive batteries and utility storage batteries are still small. SIC anode Batteries will be market makers.



SolarSIC

- ✚ TÜV certification is complete.
- ✚ The SIC solar mesh shall be designed in a first step for the repowering of existing PV field or roof top solar plants (currently 200,000 MWh installed worldwide, 40,000MWh installed in Germany alone) and for the application on greenhouses.
- ✚ The initial production of SIC Nano fiber will be performed by IPV R & D and later by IPV Manufacturing. The production of the solar mesh will eventually be outsourced to external partners for third-party consumption. The required know how is standard industry know how. A preferred partner is Freudenberg – a worldwide leader in the production of specific mesh like Gortex. Freudenberg is a German firm with 7 billion Euro turnover.
- ✚ The production cost of the SIC solar mesh is about 100 Euro/kWp.
- ✚ By applying the solar mesh on an existing polycrystalline photovoltaic plant the production of electrical energy can be increased by 200%. The SIC solar mesh produces about 230% of the electricity of the original plant with a capacity double as high and additional electricity production in the morning and the evening due to the 3- D character of the SIC solar mesh. Due to the transparency of the SIC solar mesh 70% of the photovoltaic radiation is still available for the old modules.
- ✚ The generated electricity will be fed in evenly over the 24 hours of a day which secures an attractive price for sale of electricity.
- ✚ Target customers for the repowering are especially financial investors and owners of roof top PV plants (private and commercial).
- ✚ Government applications will predominate for IPV Energy on a global basis with emphasis initially in Asia.

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Mixing

Drying

Crystallizing

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