

[별첨4_GP 양식]

CONCEPT PAPER
for KIER International Cooperation project

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<u>Title</u>	New wafering technology with electrical discharge for photovoltaics			
<u>Description</u>	<p><u>Barrier(s) to tackle</u></p> <ul style="list-style-type: none"> - Solar energy is well-known clean and sustainable source. Nevertheless, the high power generation cost prohibits its growth mainly due to manufacturing wafers, and almost 30 % of the module costs is charged on Si wafering process, thus, wafering cost reduction is the key technology to decrease the overall cost. - Among various approaches to reduce wafering cost, thin wafering technology gains the most attentions because it can directly reduce the required amount of Si. Therefore, it has been reported that wafer thickness will continuously decrease. - Slurry based multi-wire slicing is well-known as a typical wafering process, which generates a large amount of waste. Recently, diamond wire is applied for the slicing due to no slurry waste. This approach, however, needs high energy consumption because this process is based on a mechanical abrasion between wire and Si. In addition, there is limit to decrease the wafer's thickness because wafer is easily broken during the wafering process. <p><u>Strategy to solve</u></p> <ul style="list-style-type: none"> - Therefore, a new wafering technology is required to obtain thin wafers (< 100 um) without increase of production cost (decrease of production yield). - Through this project, a new thin wafering process using electrical discharge will be proposed for the first time in the world to reduce the wafer thickness with high quality and production yield. - To develop the technology, feasibility research will be conducted in KIER and Fraunhofer CSP by sharing the samples, and specific collaboration will be defined through scholar exchange and host a special session in international conferences such as EVPVSEC and PV-days. - Finally, developed technology will be transferred to German solar companies, "Crystalox and Hanwha Q-cell": Those companies have already expressed their intents to industrialize this technology for photovoltaics including matching fund for this project. 			
<u>Outcomes*</u>	<p>Wafer thickness: 80 um (single crystalline Si wafers) Wafer dimension: 156 x 156 mm Wafering yield: >98% (after drying process) Solar cell efficiency: 20% (Conventional cell process) <u>CO2 emission abatement:</u> Non-CO₂ generating process <u>Publications and/or Patents:</u> At least one journal and two patents/year & one technology transfer within 2 years after this projects</p>			