

Selective Carbon Elimination for Kerf Recycling (PV Core 1 Task 1)



A joint India-U.S. research consortium funded under the *Joint Clean Energy Research & Development Center (JCERDC)*

Scientific Achievement:

We have addressed the challenging issue of carbon contaminant removal from silicon kerf using a scalable gas-phase technology.

Significance and Impact:

This technology will allow lowering the cost of solar panels by making it possible to recycle the sawing dust (kerf) generated during ultrapure silicon slicing corresponding to 40% of the pre-wafered material (Fig. 1)

Research Details:

This research consists mainly of material characterization, development of a kinetic analysis quantitative model using a phenomenological approach, and a proposed reaction mechanism.

- We validated the elimination of carbon from kerf in a lab-scale furnace aerosol reactor and compared the results with our own experimentally derived kinetic model showing consistency (Fig. 2).
- We developed a mechanistic understanding for carbon elimination in air and nitrogen being only the first condition capable of thorough removal.
- Kerf was kindly provided by SunEdison.
- Extensive characterization techniques at the Nano Research Facility (NRF) were used for this research.

Publication: M. Vazquez-Puffleau, T.S. Chadha, G.S. Yablonsky, H.F. Erk, P. Biswas, "Elimination of carbon contamination from silicon kerf using a furnace aerosol reactor (FuAR) methodology," *Industrial & Engineering Chemistry Research* 2015. DOI: [10.1021/acs.iecr.5b00577](https://doi.org/10.1021/acs.iecr.5b00577)

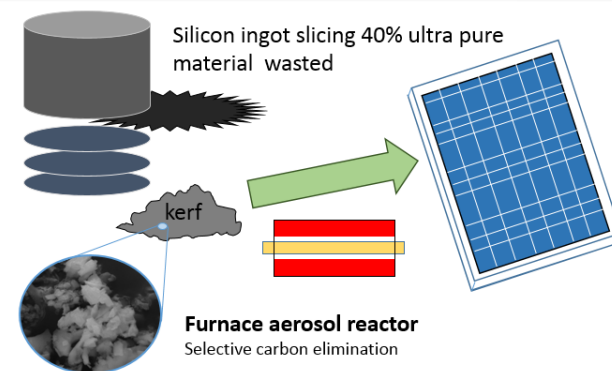


Fig. 1. Schematic of carbon elimination process toward kerf recycling

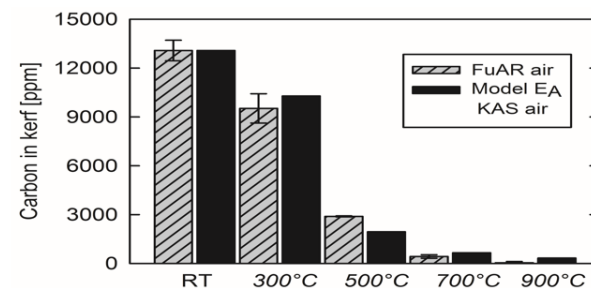


Fig. 2. Removal of carbon in kerf at various temperatures for a residence time of 6 seconds

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