

## Expression of Interest

India – Sweden Collaborative Industrial Research & Development Programme 2025

### Company Information

1. **Company Name:** Cal BioChemicals Pvt. Ltd
2. **Company Description:** Materials development company developing for sustainable building materials.
3. **Country (India/Sweden):** India
4. **Sector and subsector:** Sector: NanoMaterials Subsector: Construction Building Materials
5. **Year Established:** 2025
6. **Company Website:** [www.calbiochemicals.com](http://www.calbiochemicals.com)

### Contact Information

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**Proposed Area of Project/ Proposal:** An patented innovative developed scalable process for production of Silica (SiO<sub>2</sub>) from Rice Hush (abundantly available in India agriculture waste), which can industrially scalable and can be applied in concrete/Cement to enhance properties at the same or below the current cost of cement.

## **Summary of the Proposed Project/Proposal:**

**Patented Innovative Precipitated silica, in collaboration with IICT, from rice husk ash (RHA), produced via hydrodynamic cavitation-assisted extraction, serves as a sustainable pozzolanic additive for building construction materials like concrete and cement composites.**

### **Key Applications**

This high-purity silica (98% content, 120-240 m<sup>2</sup>/g surface area) reacts with calcium hydroxide in cement to form calcium silicate hydrate, densifying the matrix and boosting compressive strength by up to 30% at 10% replacement. It enhances durability by reducing permeability and water absorption by 30-50%, ideal for high-performance concretes in aggressive environments.

### **Our Innovative Process Adaptation**

The file's eco-friendly method—RHA digestion in NaOH under cavitation (up to 60 minutes at low temperatures), followed by CO<sub>2</sub> precipitation—yields fine particles (0.2-0.6 microns) suitable for blending into cement at 5-15% by weight. Regeneration of NaOH from Na<sub>2</sub>CO<sub>3</sub> via Ca(OH)<sub>2</sub> ensures zero-waste, cutting energy use versus quartz-derived silica.

### **Benefits Over Traditional Materials**

- Cost-effective from abundant Indian RHA waste, avoiding high-energy sand fusion.
- Improves workability, reduces alkali-silica reactions when combined with silica fume.
- Lowers CO<sub>2</sub> footprint by 8-12 tons per ton of husk used, supporting green building standards.
- Cheaply available rice husk, an abundantly agricultural waste much less than cost of cement raw materials.

Parameters	Commercail Grade Silica	Our Developed Silica	Test Method
<b>Physical Appearance Powder</b>	Snow White Free Flowing Powder	Snow White Free Flowing Powder	
<b>Particle Size</b>	3- 6 microns	0.2 microns	Particle Size Analyzer
<b>Bet Surface Area</b>	140 – 170 m <sup>2</sup> /g	200 m <sup>2</sup> /g	BET
<b>Moisture Content at 105°C</b>	3 TO 5 % max	3.62%	ISO 787-2
<b>pH of 5 % Aqueous Suspension</b>	6.5 TO 7.5	6.8	ISO 787-9
<b>Bulk Density (Tapped)</b>	0.25 -0.33 g/ml	0.1 g/ml	ISO 787-11
<b>Moisture Absorption</b>	200-250%	250%	IMS-WI-QC-003
<b>Ignition Loss on Anhydrous Basis, (1000°C, 2h)</b>	4-6%	5.2 %	ISO 3262-11

