REQUEST #RFP_2019_0235
Development Partner for Foamed Composite Resin

RESPONSE DUE DATE: December 25, 2019

Program Manager: Ryuichi Saito
Solution Provider Help Desk
Email: PHD2@ninesigma.com

Opportunity
Joint/contract development, licensing, consulting, product supply

Timeline
Phase 1: Prototype production within 1 year
Phase 2: Establishment of mass production technology within 2 years (after the completion of Phase 1)

Financials
Budget for Joint development already secured (Detailed amount and sharing to be negotiated based on proposal)

DESCRIPTION
NineSigma, representing a major manufacturer with sales of several hundred billion yen (“Client”), seeks a development partner for lightweight foamed resin composites reinforced by cellulose nanofibers (CNFs). The Client needs a range of approaches including additives for improving foaming conditions, foamed resin production process, etc. Various applications from partners aggressive to develop sustainable materials are welcome.

TARGET PROPERTIES
The Client aims to meet the following requirements and properties for CNF-reinforced polyolefin or bio-based resin foam composites.

- **Matrix resin**
  - Structure: Polypropylene, polyethylene, bio-based resin, etc.
- **Additive amount of CNF**: 0.5-10 wt%
- **Porosity**: ≥80%
- **Target strength properties (reference)**
  - Flexural modulus (ISO178): Maintain physical properties before foaming as much as possible
  - Impact resistance (Charpy impact test at 23°C, ISO179): Maintain physical properties before foaming as much as possible

Even if you have no clear prospect of development at this time, co-development partners with technical approaches and knowledge that can contribute to the target property achievement by combining with proprietary technology of the Client are required. Proposals from organizations with the intention of joint development are especially expected.

POSSIBLE APPROACHES
The Client expects technological approaches such as the following, but is open to others:

- Improvement of foaming condition by using additives
- Development of resin or CNF suitable for foamed resin
- Optimization of foamed resin production process
- Other technologies or combinations of above approaches

APPROACHES NOT OF INTEREST
The following technologies are not of interest:

- Technology with no track record of developing and manufacturing foamed resins
BACKGROUND
The Client has been developing lightweight and highly durable materials to build a sustainable society. By foaming a CNF-reinforced resin composite, a thinner-than-conventional resin member with the same-as-conventional stiffness and strength can be developed, which will improve fuel efficiency and reduce resource consumption in automobiles, etc. Despite strenuous efforts for technological development, the Client has not identified effective technical approaches yet with aims such as weight reduction having not been achieved. It is urgent to put sustainable materials to practical use as soon as possible by identifying a partner(s) for the advanced technology development and accelerating research and development. The Client hence decided to recruit technology proposals.

ITEMS TO BE SUBMITTED
Please include the following items in your proposal:

- Outline, characteristics, and principle of proposed technology
- Uniqueness of proposed technology
- Development stage: concept level, technology currently being established, or implemented for practical use
- Performance data (as much information available as possible)
  - Material composition (resin type, mixing ratio with filler, other additives)
  - Manufacturing/prototyping method
  - Porosity
  - Weight reduction effect
  - Elastic modulus
  - Impact resistance
- Current challenges and future development plans
- Conditions for sample testing (e.g., sample quantity available, costs, period, contract terms)
- Applicability to mass production process
- Past results (e.g., additional data to demonstrate your R&D capability such as research papers and patents)
- Profile of proposer

Please submit your proposal via NineSights, the platform of NineSigma’s Open Innovation community, which allows you to manage all your proposals. Please contact the Solution Provider Help Desk phd2@ninesigma.com for assistance about registration and proposal submission.

NOTES ON RESPONSE
Proposal shall have clear points and should not include confidential information. Supplemental files may be submitted in addition to the proposal.

RESPONSE EVALUATION
The client will evaluate all responses with the following criteria.
- Overall scientific and technical merit
- Approach to proof of concept or performance
- Economic potential of concept
- Realism of the proposed plan (action items, timeline, roles, deliverables, cost estimation)
- Potential for proprietary position
- Respondents’ capability and related experiences

ANTICIPATED PROJECT PROCESS
After the submission due date, the client will review all submitted proposals. NineSigma will send the review results to each proposer 6-8 weeks after the due date. The client possibly asks clarifying questions before selecting the most suitable candidates for collaboration. The client will select best candidates through evaluations. During the selection process, the client may execute NDA with selected respondents, seek further information disclosure, and discuss specific development targets or potential opportunities. The client will execute necessary agreements with the selected respondents and move to the advanced development phase. Specifics of any collaboration will be determined through consultation with the concerned parties.