NINESIGMA

Request for Proposal

NineSigma – Connecting technology seekers with solution providers around the globe

REQUEST #RFP_2019_0151

Resin Material Capable of Maintaining High Strength in High-Temperature Environment

RESPONSE DUE DATE: September 16, 2019

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Opportunity
Joint/contract development, licensing, product supply

Timeline
Phase 1- Verification based on a prototype: Within 3 years
Phase 2- Development toward practical use: Within 5 years

Financials
Details open to negotiation based on proposals

DESCRIPTION

NineSigma, representing a **leading automobile parts manufacturer,** seeks **resin material with high strength property in high temperature that can be substituted for metals**. Specifically, they anticipate a partner who develops resin/composite material that exhibits excellent creep resistance without strength reduction even in high-temperature environment (around 200°C).

KEY SUCCESS CRITERIA

Requirements for targeted material

The Client is looking for resin or composite with the following characteristics on the premise of application to automobile parts:

- Mechanical strength in high temperature:
  - Specific tensile strength: ≥111 MPa/(g/cm^3) at 165°C
  - Creep characteristic: elongation of ≤0.2% after applying tensile stress of 50 MPa to the material at 165°C for 4000 hours
- Corrosion resistance: capable of maintaining the above specific tensile strength after the material is placed in the following corrosion environment:
  - Corrosion environment: Immersed in acidic aqueous solution containing sulfuric acid (10 g/l) and formic acid (20 g/l) for 100 hours
- Moldability: desirably capable of being formed by injection molding:
  - Melting temperature: ≤450°C
  - Molding pressure: approx. 200 MPa

It is not necessary for all the above requirements to be met at this point; proposals are welcome if there is a good chance of meeting them through further development within approx. two years.

Proposer requirements

- To be able to provide samples for characteristics evaluation by February 2020:
  - Preferable sample is as follows:
    - Assumed specification: ISO527
    - Size: approx. 170 mm in length x 10 mm in width x 4 mm in thickness
  - The sample test cost preferably less than 5 thousand dollars in total
  - Samples for the test is not necessary to meet the “Requirements for targeted material”; it is acceptable if its characteristics at higher temperatures can be evaluated.

POSSIBLE APPROACHES

The Client expects technologies such as the following approaches, but is open to others:

- Modification of engineering plastic
  - Polyimide, polyamide-imide, polyetherimide, PEEK
- Other new resin material or filler-containing composite with high heat resistance

APPROACHES NOT OF INTEREST

The following approaches are not of interest:

- A single additive or filler material only

BACKGROUND

In industrial sectors such as automobiles and airplanes, expectations for lightweight and high heat-resistance resin materials have been rising from an energy saving perspective. Although engineering plastic materials, featuring high heat resistance and strength, have been put into practical use, material designed to be used continuously in an environment exceeding 200°C has not been developed. The client has also engaged in the development of such material but has not yet commercialized the material with the required high strength property in high temperatures. High functional materials are developed in various industrial sectors and have potential for providing a technological breakthrough. The client has therefore decided to make this RFP to further accelerate the development of their research and development endeavors.

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
- Current performance
  - Specific tensile strength
    - At room temperature
    - At high-temperature environment (under the conditions of 150°C and 200°C, if data are available)
  - Creep characteristic and its measurement conditions
  - Corrosion resistance and its measurement conditions
  - Moldability (melt flow rate or a proven molded article)
  - Glass transition temperature
  - Density
  - Other physical and mechanical property (e.g., Poisson's ratio, linear expansion coefficient, Charpy impact test results, if data are available)
- Current challenges and future development plans
- Sample test conditions (e.g., sample form, quantity that can be provided, cost, period, necessity of NDA)
- Potential for scale-up
- Past results (e.g., research papers, patents)
- Organization overview

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.