REQUEST #RFP_2019_0213(0214)
Nano-scale Pulverization Technology for Food Materials

RESPONSE DUE DATE: December 13, 2019

Contact:
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Opportunity
Contract development, contract manufacturing, product sales, joint development, and technology licensing

Timeline
Partner selection: Within 6 months
Establishment of technology at the laboratory level: About 1 year from the start of the collaboration
Establishment of technology in the actual manufacturing process: About 2 years from the start of the collaboration

Financials
Required budget guaranteed (negotiable depending on the proposal)

DESCRIPTION
NineSigma, representing a multi-billion-dollar food manufacturer, seeks proposals for nano-scale pulverization technology for food materials.

Prerequisite: Food materials that the technology to be applied
<Top Priority>
- Coffee
  - Roasted coffee beans with a diameter of approximately 1–1.5 cm or roasted coffee beans grounded to a diameter of approximately 1–2 mm
  - Contains 10–20% oil as a component, plus polysaccharides (mostly mannan, arabinogalactan, and cellulose) and protein

<Others>
- Tea leaf
  - Dry tea leaves or dry tea powder
- Citrus peel
  - Raw/frozen fruit skins (containing water) or dried fruit skins

Technical requirements for this proposal
At this time, any proposal that meets the following essential requirements is welcome.

<Essential Requirements>
- Can pulverize in the median range of 100 nm to 1 µm
  - All grinding technologies including dry grinding, wet grinding, freeze grinding, etc. are acceptable.
- Can be applicable to food (especially coffee)
  - Even if there is no experience of application to food (especially coffee), the technologies which has high possibility for food application through additional development are acceptable.
- Can prevent aggregation and agglomeration of particles by using the materials which are applicable in food and beverage industry

<Nice to Have>
- Prevents the deterioration of flavor and the oxidation of food materials during pulverization
- Particle sizes can be adjusted with little deviation
  - E.g. both 100 nm and 500 nm particles can be created
• Has knowledge about the taste and mouthfeel of nanoparticles of food materials
• Has knowledge about solubility and dispersion of food materials after grinding

**ANTICIPATED APPROACHES**

A wide range of approaches are welcomed. Examples are as follows but are not limited to:

• Dry grinding
• Wet grinding
• Freeze grinding
• Jet mill
• Bead mill
• Ball mill
• Technology combining multiple types of mills
• Technology such as ultrasonication and cavitation, and combination of mill and these technologies
• Utilization of nitrogen gas during pulverization
• Uniform particle size using a sorting system

**BACKGROUND**

A client of NineSigma, who is a major food manufacturer, aims to contribute to enrich the lives of customers by proposing products with unprecedented taste and functionality. The client already has coffee powder with the size of tens of micrometers, but because the coffee contains a lot of oil, it is difficult to pulverize to nanometer scale. If food materials can be nano-pulverized, it will be possible to develop attractive products that bring out their characteristic flavors. Therefore, the client has issued this open request in order to identify a promising organization with pulverization technology for food materials (especially coffee).

**ITEMS TO BE SUBMITTED**

Please include the following items in the proposal.

• Overview of the proposal
• Principle of the technology
  o Principle of pulverization
  o Pulverizable size of food materials
  o Principle of prevention of aggregation and agglomeration of particles
• Development stage (lab level, under consideration for practical use, already commercialized)
• Related data and application
  o Type of material pulverized
  o Particle sizes before and after pulverization
• Application examples
• Application experience and prospects for each target food material (coffee, tea leaves, citrus peel)
• Sample test conditions (scale, cost, duration, with or without NDA, etc.)
• Challenges and solutions for realizing the requirements of the client
• Status of intellectual property concerning proposals, and the wishes concerning the handling of newly generated intellectual property
• Track records (research papers, patents, additional information that shows R&D capabilities, etc.)
• Organization overview

All proposals should be submitted online at NineSights, the NineSigma open innovation community, to manage the application history. For assistance, please contact the Solution Provider Help Desk phd2@ninesigma.com.

**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 reviewing submitted proposals, the client possibly ask 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.