



**Re-Advertisement**

**EXPRESSION OF INTEREST**

**MANUFACTURING PLANT FOR THE PRODUCTION OF NANOFIBER  
FILTRATION MEMBRANE AT INDUSTRIAL SCALE**

# **MANUFACTURING PLANT FOR THE PRODUCTION OF NANOFIBER FILTRATION MEMBRANE AT INDUSTRIAL SCALE**

## **1. INTRODUCTION**

The Botswana Institute for Technology Research and Innovation (BITRI) through its subsidiary BITRI Investments (Pty) Ltd and Citizen Entrepreneurial Development Agency (CEDA) invites suitable citizen owned manufacturing companies (particularly Youth, Women and People with Disabilities) to respond to the EOI to produce the Nanofiber Membrane. The parties intend to partner with a citizen owned manufacturing company that will produce the filtration nanofiber membrane at a large scale. The production requires an industrial scale nanofiber production facility locally in Botswana to partner with BITRI and CEDA to supply local and international companies with nanofiber membrane in the air filtration sector.

## **2. BACKGROUND**

### **2.1 BITRI**

BITRI is a parastatal under the Ministry of Tertiary Education Research, Science and Technology, established in 2012 to conduct needs-based research and development in focused areas in accordance with national priorities. The Mandate of BITRI is to identify, develop and/or adapt appropriate technology solutions that provides sustainable innovative solutions through co-creation and collaboration in line with national priorities and needs of Batswana. The technologies will as much as possible maximize the use of local materials to ensure efficiency and affordability. BITRI will harness its institutional capacity as well as collaborate with other organizations and institutions.

BITRI Investments is a 100% owned subsidiary and commercial arm for BITRI. It is the holding company for new venture creations that are generated from successful research and development undertaking at BITRI.

### **2.2 CEDA**

Citizen Entrepreneurial Development Agency (CEDA) is a development financial institution fully owned by the Botswana Government. It was established in August 2001 in response to the recommendations from National Conference on Citizen Economic Empowerment held in 1999 and the 4th Evaluation of FAP which called for support for business development to promote development of citizen entrepreneurship. In pursuit of this goal, CEDA places emphasis not only on funding, but also on the development of citizen entrepreneurs through provision of training and mentoring services.

The control of CEDA is vested in the Board of Directors appointed by Government.

#### **2.2.1. The underlying objectives of CEDA are:**

To foster citizen entrepreneurship and empowerment  
To achieve economic diversification

To encourage the development of competitive and sustainable citizen enterprises  
To create sustainable employment opportunities  
To promote the development of vertical integration and horizontal linkages between citizen enterprises and primary industries in agriculture, mining and tourism  
To improve efficiency in the delivery of services to business

### **2.2.2 Products/Services Offered**

CEDA products and services are loan financing, equity, non-cash instruments and provision of training and mentoring services.

## **3. ABOUT THE NANOFIBER FILTRATION MEMBRANE**

The product is non-woven electro-spun nanofiber membrane made of PA 6 polymer with good contaminant blocking capacity at sub-micron level. It is capable of sieving some Nanoparticles including unwanted bacteria and micro-particles. This filter material is a critical component or key feature in the respiratory mask industry (especially in 3 layered masks).

### **Key Features**

- i. High Breathability
- ii. Particulate Matter Proof
- iii. Light Weight

## **4. APPLICATION AREAS**

Filtration Technologies at BITRI uses nanofiber membranes to develop various products and this first version of the nanofiber production plant will be most suitable for air-filtration application especially dust masks and surgical masks.

The nanofibers will overtime induce local production of filtration products like (air filters) and health related products (surgical suits, head mops etc.)

## **5. TECHNOLOGY TRANSFER**

BITRI Investments (Pty) Ltd will be a Joint Venture partner with the company to ensure the appropriate quality of the membranes produced. This will involve sampling of the polymer solutions and the membranes that are produced to ensure consistency.

## **6. FUNDING OPPORTUNITY**

As a participant in attracting interest in the proposed enterprise, CEDA will consider funding the proposed project subject to the normal lending terms and conditions. The Agency will consider funding the proposal, by providing debt facility to the company/joint venture, equity and/or structured financing instruments. Proposals for equity funding are best structured with

a citizen shareholder, to whom CEDA would relinquish their shares on exit. CEDA's funding participation will be limited to P50 million.

## 7. PRODUCTION REQUIREMENTS

The Nanofiber membrane manufacturing plant should satisfy the following technical requirements:

- 7.1 Production of a minimum of 5000 square meters of 0.3 gsm (weight) of at least 200 mm width, nanofiber membrane per month.
- 7.2 The production facility should be able to produce nanofiber membranes derived from polymers such as polyamides and polyurethanes.
- 7.3 Production facility should be in Botswana.

## 8. ELIGIBILITY

Interested parties must provide information indicating their expertise and experience that is relevant in undertaking a project for the production and supply of nanofiber membranes to meet industry demands.

- 8.1 Company profile, including a valid certificate of incorporation from CIPA, BURS clearance certification, trading license, Industrial License.
  - 8.1.1 Director's Forms
  - 8.1.2 Nature of Ownership e.g. Sole proprietary, Joint Venture etc.
- 8.2 Category of the firm: Large / Medium / Small Scale Unit / Startup.
- 8.3 State the line of Business including the Sector and Subsectors.
- 8.4 A clear project outline, indicating the scope of the work to be undertaken by the Company.
- 8.5 Audited financial statements 3 year for existing **companies** or future financial projections for start-ups.
- 8.6 Availability of resources or proof of capacity for putting in place such, including
  - 8.6.1 Qualified and/or experienced staff, providing Curriculum Vitae of key staff and
  - 8.6.2 Appropriate physical facilities (industrial scale electrospinning facility) in Botswana.
- 8.7 Special Dispensation will be given to Youth, Women and People with Disabilities owned Companies with requisite skills and/or with companies with fulltime employees.
- 8.8 The EOI is strictly reserved for **100% Wholly Owned** Citizen Companies only including **Joint Ventures and/or Sub Contractors**.

BITRI and CEDA will shortlist (pre-qualify) potential strategic manufacturing partners basing on the assessment of the received EOI and the criteria stipulated above. Shortlisted **Citizen Owned** manufacturing companies will be invited to tender for the required services by

responding to a detailed **Invitation To Tender (ITT) OR Send a Comprehensive Joint Venture Proposal.**

## **9. TECHNICAL ENQUIRIES**

Clarifications pertaining to this EOI may be obtained between **0730 -1230 hours and 1345-1630 hours, Monday to Friday**, OR be forwarded either in writing, facsimile or email to:

Senior Researcher – Nanomaterials

Email: [imavunkal@bitri.co.bw](mailto:imavunkal@bitri.co.bw);

Phone Number (+267) 360 7594

## **10. SUBMISSION REQUIREMENTS AND CLOSING DATE**

Expressions of Interests clearly marked “**Manufacturing Plant for the Production of Nanofiber Filtration Membrane at Industrial Scale**”, should be hand delivered to:

Registry

Botswana Institute for Technology Research and Innovation

Private Bag 0082

Plot 50654, Machel Drive

Gaborone, Botswana

The EOI should reach the above address not later than **11<sup>th</sup> January 2022 at 1600 hours**. Botswana time.

Submission received after the above deadline will not be considered.

Expression of Interest from companies failing to provide the required information will be disregarded. Invitation to bid and any subsequent purchase order will be issued in accordance with procurement rules and procedures of Botswana Government.

This Expression of Interest does not entail any commitment on the part of BITRI and CEDA, either financial or otherwise.

## 11. TECHNICAL SCORE TABLE

ITEM	SPECIFICATION	WEIGHTING
<b>1. Industrial Scale Electrospinning Unit</b>	<ul style="list-style-type: none"> <li>Should be able to produce at least 5,000 m<sup>2</sup> of 0.3 g/m<sup>2</sup> membrane.</li> </ul>	<b>Pass/Fail</b>
	<ul style="list-style-type: none"> <li>Width of the substrate: 1.0 – 2.0 m</li> </ul>	<b>Pass/Fail</b>
	<ul style="list-style-type: none"> <li>Should be upgradable to a higher capacity</li> </ul>	<b>Pass/Fail</b>
<b>2. Solvent compatibility</b>	<ul style="list-style-type: none"> <li>Resistant to corrosive solvents like Formic acid and Trifluoroacetic acid</li> </ul>	<b>Pass/fail</b>
<b>3. Solvent Capture</b>	System to trap all the solvent vapors	<b>Pass/Fail</b>
<b>4. Range of Polymers</b>	Water soluble and non-water soluble	<b>Pass/fail</b>
<b>5. Climate control</b>	<ul style="list-style-type: none"> <li>Humidifier/dehumidifier</li> <li>RH Level 10 – 80%</li> <li>Temperature 20 – 50 °C</li> </ul>	<b>Pass/fail</b>
<b>6. Roll collection system</b>	Continuous roll to roll collection with subsequent cutting system Cutting size range: 100 mm to 200 mm	<b>Pass/fail</b>

Item	Specification	Score
Membrane consistency	Uniform membrane thickness in the middle and the edges of the substrate	
	<ul style="list-style-type: none"> <li>100% uniform</li> </ul>	<b>20</b>
	<ul style="list-style-type: none"> <li>98% uniform</li> </ul>	<b>16</b>
	<ul style="list-style-type: none"> <li>95% uniform</li> </ul>	<b>12</b>
	<ul style="list-style-type: none"> <li>Less than 95%</li> </ul>	<b>0</b>
	Please see schematic diagram below:	

Extent to which solvent is captured	<ul style="list-style-type: none"> <li>• 100%</li> <li>• 95% to 99%</li> <li>• 85% to 94%</li> <li>• Less than 85%</li> </ul>	<p><b>20</b></p> <p><b>16</b></p> <p><b>12</b></p> <p><b>0</b></p>
Substrate cutting unit	<ul style="list-style-type: none"> <li>• Automatic Pass</li> <li>• Manual</li> </ul>	<p><b>20</b></p> <p><b>16</b></p>
Adhesion module	• Integrated to the instrument	<b>20</b>
	• Not integrated	<b>15</b>
Stitching module	• Integrated to the instrument	<b>20</b>
	• Not integrated	<b>15</b>

**Total : 100**

**NB: A minimum of 70% score is required for a company to be considered for inclusion in the list.**