

Personal Protective Equipment (PPE) & Sustainable Manufacturing at NRC

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Virtual Circular Economy Workshop
Sustainable Materials – Innovating Our Future Beyond the Pandemic

September 23rd, 2020



Outline

- About NRC
- NRC's COVID-19 Response
- Advancing the Manufacturing of Sustainable Personal Protective Equipment (PPE) in Canada
- Environmental impact of PPE and NRC's upcoming initiatives

We are the Government of Canada's
largest research and development organization
with over 100 years of experience

WHAT WE DO

**WE ADVANCE
SCIENTIFIC
AND TECHNICAL
KNOWLEDGE**

**WE DELIVER
POLICY SOLUTIONS
FOR GOVERNMENT**

**WE SUPPORT
BUSINESS
INNOVATION**



NRC's COVID-19 Response



Vaccines and Therapeutics

The NRC is working with partners to advance research and technology development for therapies and vaccines to treat and prevent COVID-19.



Building the infrastructure

The NRC is preparing to manufacture COVID-19 vaccines in Canada for Canadians, as construction begins on a new Good Manufacturing Practices (GMP) compliant biomanufacturing vaccine facility (BVF) on Royalmount Avenue, in Montréal.



Testing and Diagnostics

The Government of Canada is focused on building capacity in Canada to develop innovative testing and diagnostic solutions, and purchase essential supplies using existing industrial and innovation programs like the Innovative Solutions Canada (ISC) program.

NRC's COVID-19 Response



Digital Health and Analytics

Identifying and detecting potential outbreaks of infectious disease around the world remains our best defence against these threats in Canada. Today, as the world adapts to living with COVID-19, finding the virus and tracking it in our communities is an important way to contain its spread and protect Canadians.



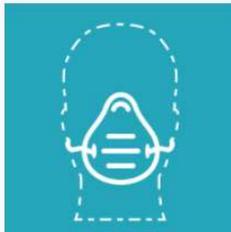
PPE and Sterilization

N95 respirators and surgical face masks are important examples of personal protective equipment (PPE) used to keep airborne particles and droplet hazards from contaminating the user's face and potentially exposing them to COVID-19. The NRC is working to ensure the safety and effectiveness of PPE in Canada by lending its expertise to develop PPE and the capability to test its performance, providing testing services for PPE and decontamination equipment, and funding research and development for innovative, made-in-Canada solutions to keep Canadians safe.

NRC's ISC Challenge on Made in Canada Filtration Materials

COVID-19 Challenge: Made in Canada filtration material for the manufacture of N95 respirators and surgical masks

From: [Innovation, Science and Economic Development Canada](#)



To protect healthcare personnel against exposure to airborne particles and droplet hazards related to the Covid-19 pandemic, the National Research Council of Canada (NRC) is seeking a solution that will provide alternative filtration materials at large scale volumes that are suitable for use in the manufacture of N95 respirators and surgical masks for healthcare workers.

Challenge Sponsor: National Research Council of Canada (NRC)

Funding Mechanism: Grant

Opening date: April 7, 2020

Closing date: April 17, 2020, 18:00 Eastern Daylight Time

Prospective applicants should refer to the Innovative Solutions Canada Grant Instructions and Procedures [document](#).

[Phase 1 award recipients](#)

[Phase 2 award recipients](#)

NRC's ISC Challenge on Made in Canada Filtration Materials

Challenge Winners:

- Roswell Downhole Technologies (Calgary, Alberta)
 - Repurposing an existing extrusion facility for the production of **conventional meltblown filtration material** for the manufacture of **disposable** surgical masks and respirators
- Stedfast inc (Granby, Quebec)
 - **Alternative filtration material** for the manufacture of **re-usable** (washable) surgical masks and respirators
- Performance Biofilaments (Vancouver, British Columbia)
 - **Cellulosic filtration material** for the manufacture of **compostable** surgical masks and respirators



ROSWELL
DOWNHOLE TECHNOLOGIES



ROSWOOL
TEXTILES

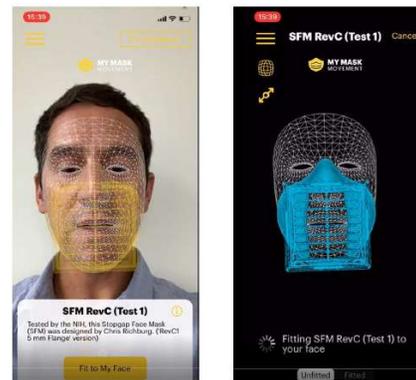
Stedfast
ADVANCED BARRIER TECHNOLOGIES

PERFORMANCE
BioFilaments

NRC's collaboration with Dorma Filtration on Re-usable 3D-Printed Respirators

The NRC is joining forces with Dorma Filtration to help make respirators using 3D printing, injection moulding and digital technology:

- Customized fit for users based on facial scan for the manufactured shape
- Improved filtration efficiency and breathability
- Re-usable (sterilization)



The NRC also supports Dorma Filtration for testing their products in view of obtaining Health Canada's authorization.

This project will not only allow the NRC and Dorma Filtration to increase the availability of PPE for Canadians and the international market, but it will help reduce production costs and speed up manufacturing of this new line of N95 masks.

Reference: <https://nrc.canada.ca/en/covid-19-response-personal-protective-equipment-sterilization#a7>

Environmental impact of PPE

- Most disposable PPEs are **single-use plastics**, made from **petroleum-based polymers** that are **not biodegradable**.
- After their use:
 - The vast majority is treated as non-dangerous general solid waste, and is **ultimately landfilled**¹.
 - The remaining fraction is treated as biomedical solid waste, and is either **i) decontaminated and landfilled**, or **ii) incinerated**¹.
 - A fraction is improperly disposed of, and **lost to the environment**.
- As of June 2020, based on PPE consumption projections, Health Canada estimated that **63,000 tons** PPE would be disposed in Canada this year.



Picture: Opération Mer Propre

Reference:

¹Guide de gestion des déchets du réseau de la santé et des services sociaux, Gouvernement du Québec, 2017.

Environmental impact of PPE

Upcoming Initiatives

- In November 2018, the CCME has adopted [Canada's Zero Plastic Waste Strategy](#) to reduce the environmental impact of plastics and promote a circular economy.
- To support this strategy and obtain results in a reasonable timeframe, the [NRC](#), together with [Environment & Climate Change Canada](#), [Health Canada](#) and [Natural Resources Canada](#), are working on 2 other initiatives which will help reducing the environmental impact of PPE:
 - [Compostable](#) disposable surgical masks and compostable disposable respirators used in the Canadian healthcare system
 - [Recycling technologies](#) for disposable (single-use) Personal Protective Equipment (PPE) used in healthcare sector



Picture:

Environment Canada on Twitter, <https://twitter.com/environmentca/status/1055866937807376390>.

NRC-CNRC

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THANK YOU

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Council Canada

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Canada 