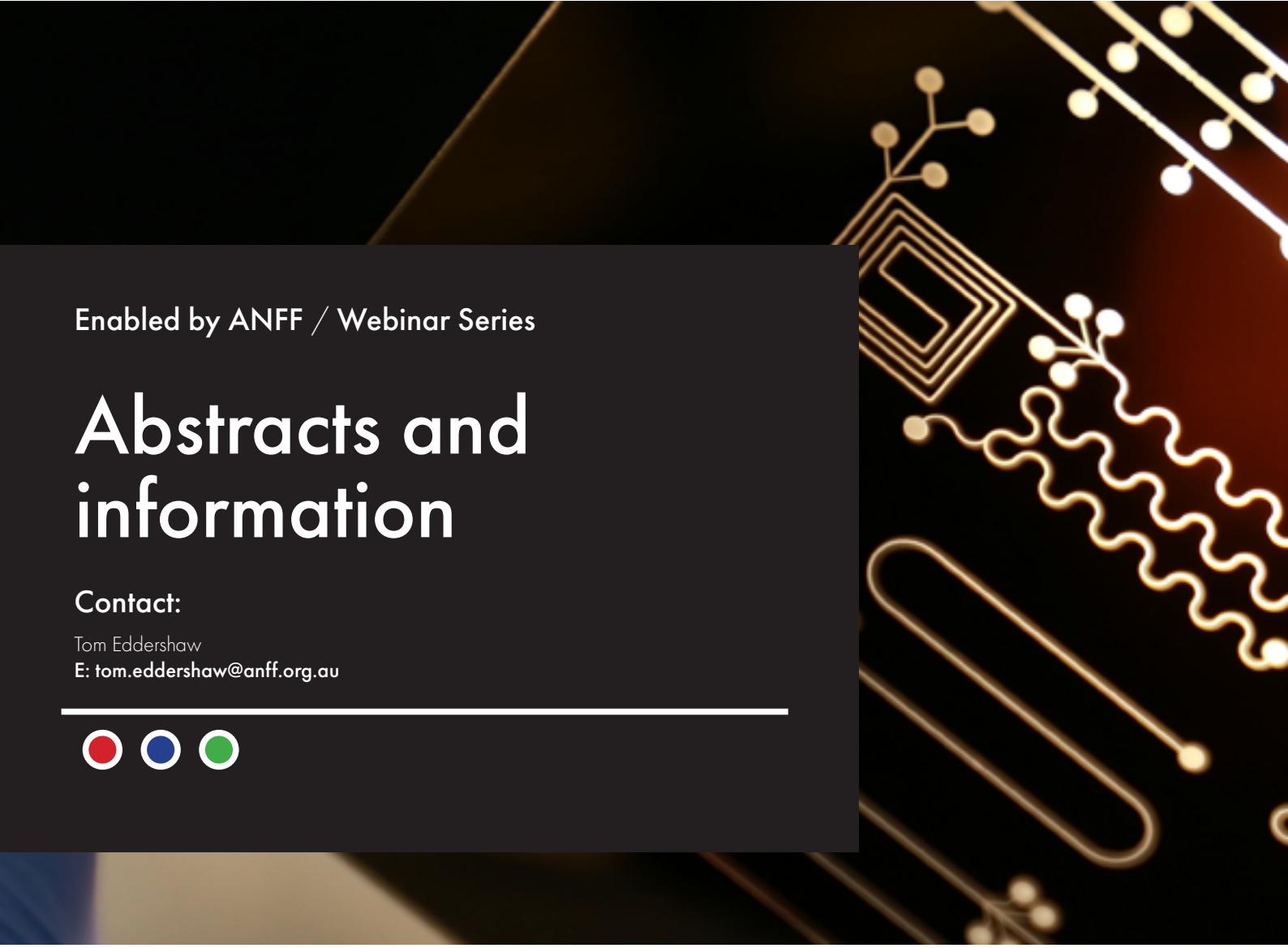

Enabled by ANFF / Webinar Series

Abstracts and information

Contact:

Tom Eddershaw
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Starting in October, ANFF is hosting six free webinars to celebrate the exciting science being conducted with the assistance of the network.

We hope that you'll join us to hear about the exciting developments that ANFF has been enabling. Please find the talk abstracts below.

If you have not yet registered for the webinar series, please do so by clicking **this link**. This will ensure you receive the relevant information.

This webinar series has been introduced due to the situation in Melbourne making it unsafe for us to proceed in with the ANFF Retreat and Research Showcase in a responsibly safe fashion.

The "in person" part of the event, themed on the title *Enabled by ANFF*, will be held 11-13 May 2021 in Melbourne. More details to come.

If you have any questions, please contact **Tom Eddershaw**.

This event would not be possible without the support of our valued sponsors.

Event and Gala Dinner sponsor

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Six webinars will be held, with one focused on each of the following research priority areas.

Construction Science (21 October)

New and novel technologies to enhance construction materials and buildings of the future.

MedTech (28 October)

Developments in medical technologies that will help form Australia's economic future.

Space and Defence (4 November)

Furthering the technologies designed to aid space exploration, or to view Earth from high above.

Comms and Cybersecurity (11 November)

An overview of research that is improving the transmission or security of communication and data.

Energy (18 November)

Improving the energy outlook via new technologies or increasing the efficiencies of established ones.

Food and Agribusiness (25 November)

Uses of technology to improve the quality of food, or to help produce it.

Each online session will be one hour long and will feature two talks.

Enabled by ANFF / Webinar Series

Construction Science

Speaker:

Dr Pratheep K. Annamalai
University of Queensland

Spinifex nanofibre applications in building materials

Biography: Dr. Pratheep K. Annamalai is a Research Fellow at The University of Queensland (UQ). He received PhD in Chemistry from the University of Pune, developed expertise in polymer physics at the Université Montpellier in 'smart materials' at the Adolphe Merkle Institute, Fribourg. He is broadly interested in the valorization of biomass feedstock into reactive and nanoscale building blocks for improving the performance and utility of materials for infrastructure, energy and food. He is a recipient of two UQ-Excellence awards for leadership and industry partnerships. He has invited committee member for ISO/TC229-WG2 for characterization of nanomaterials, guest and academic editor for various journals.

Abstract: The spinifex grasses have evolved as extremophile species and been traditionally cultivated and used for thousands of years involving Aboriginal knowledge. As part of our research partnership with an Indigenous Australian community for exploring advanced materials applications towards bioeconomy, we discovered that lignocellulose nanofibers (CNF) can be cost-effectively produced this arid biomass. Our research includes cost-effective production, surface modification and industrial applications of the spinifex nanofibre.

Concrete is the second most used product accounting for nearly 3 tonnes per capita per year. Recently, the incorporation of nanoscale functional additives including nanocellulose in cementitious materials is explored for good control over processibility, the physical structure of hydrates and improvement in flexural strength. In this paper, we demonstrate the use of nanofibre extracted from an Australian biomass 'spinifex grass', for improving the mechanical performance of various cementitious materials. A simple direct mixing of aqueous suspensions of these nanofibres into the cement (grout), fly-ash substituted cement and sand containing mortar samples showed a significant improvement in the adhesive properties as evidenced from rheological properties measurements. After curing for 28 days, the nanofibre incorporated samples have shown significant improvement in flexural strength (upto 24 % in cement and 20 % in mortar) depending on the nanofibre types used. This improvement in Type 1 cement is remarkable, as it can have implications in cement industries for the durability and potential reduction of cement material. I will discuss the insights into the relationship between different nanofibre processing and mechanical properties of cementitious materials.

Enabled by ANFF / Webinar Series

Construction Science

Speaker:
Professor Mick Withford
Macquarie University

Fibre optic sensors for concrete management applications

Biography: Michael Withford is a Distinguished Professor at Macquarie University, Sydney, Australia. He leads a research team investigating photonics and laser applications, and the OptoFab Node (optofab.org.au) of the Australian National Fabrication Facility.

Professor Withford's current research activities range from laser device development, laser microfabication, microphotonics, astrophotonics and applying photonic methods to ancient artefacts. He has supervised 28 postgraduate students, holds several patents and has published over 160 refereed journal papers and several hundred conference papers. He is a Fellow of OSA, SPIE and IAPLE. In 2017 he co-founded and serves as CEO for new start-up company Modular Photonics (www.modularphotonics.com). Modular Photonics was recently awarded a 2017 Austrade Going Global Prize, 2018 Australian Engineering Excellence (Sydney) Prize, 2018 iAward Prize – Consumer Market category, 2019 SPIE Prism Award, 2019 Lightwave Innovation Award and 2020 Cabling Innovation Award.

Abstract: Sydney Water spends $60m per year in the management and rehabilitation of deteriorated concrete sewers due to corrosion. Currently, water utilities do not have an in-situ, online monitoring capability for their wastewater assets.

In this talk we will outline an innovative optical fibre sensing system, enabled by ANFF capabilities, that is enabling asset managers to monitor concrete corrosion and reduce maintenance costs. A key outcome is the development of long-lived optical fibre sensors that monitor temperature, strain and relative humidity in concrete structures.