### MagnumBat

#### Safer, better, and more affordable batteries

#### Safe, high energy density batteries

The demand for batteries, for both small and large scale applications, is expected to increase exponentially in the coming years. We develop new solid-state batteries based on inexpensive, abundant, and non-toxic elements, such as magnesium.

Compared to the current market standard, Li-ion batteries, Mg-based solid state batteries promise higher safety, better performance, and easier manufacturing at a lower cost. However, so far the lack of a sufficiently conducting electrolyte has inhibited the realisation of such batteries; here, we present a new highly conducting electrolyte material which could finally allow for the commercialisation of the battery of tomorrow.

#### Advantages of Mg-based batteries



#### 

Our invention – A highly conductive electrolyte



#### **Technology Description**

We have developed a new type of solid electrolyte which is compatible with the abundant and widely available metal, potentially providing Mg, an unprecedented density and exceptional energy performance. The material shows high ionic conductivity in a practically achievable temperature range and does not suffer from the same safety issues observed in commercial Li-ion batteries. Investigations of the electrochemical stability suggests that a battery using this material with a Mg-anode can be operated at 1.2 V using affordable cathode materials.

#### **Intellectual Property Rights**

PCT Application filed 2019-09-13.

#### **Current State**

We have characterized the properties of the electrolyte on its own, in conjunction with a Mg-anode and in full batteries with promising results. Current efforts are directed at optimising materials and battery assembly in order to produce a competitive product.



**Business opportunity and Call to action** We are working towards establishing a spin-out company to mature the technology into a working prototype. We seek a commercial manager and investors to join us.





Contact information Morten Holmager Business Development Manager Mobile: +45 9350 8718 E-mail: holmager@au.dk



# ANCHORGRIP ENHANCED PERFORMANCE

**Sustainability & Advanced Materials** 

by providing efficiency and comfort, creating longer lasting equipment, while decreasing injuries and making sports in general more attractive.



### **DETECTED PAINS = HUGE OPPORTUNITY**

1. Cylindrical handle shape not optimized to the hands functions 2. The surface produces blisters and injuries

3.Friction properties decrease from dry to

### wet state



Current solution – cylindrical handles with synthetic suede sheet or rubber handles

### AnchorGrip

Ergonomic geometries with an innovative surface material

Provides a good grip, not slippery even when you sweat ✓Decreases blisters and injuries  $\checkmark$  Is hygienic and easy to replace Provides reliable attachment  $\checkmark$  Is supercomfy



### AnchorGrip has huge market potential and positive prospective revenue



On the initial stages the product is directed to sweep rowing in the Danish market. The following years the commercialization will be expanded to other European countries. This process will be followed by globalization and adaptation and expansion to other domains.

```
10 year revenue when expanding to other domains
                                            Other industrie
```

### Tested by Olympic and elite rowers





### **Technology Description**

The project started of as a co -joined bachelor and master thesis in collaboration with Team Denmark, the Danish Rowing Association and IPU. The team has since received PoC funding and the Discovery Grant to further develop the technology and start commercial activities.

The technology provides improved grip, both in wet and dry states, reduces blisters and increases comfort. These properties are enhanced by combining ergonomic geometries with an innovative surface material.

### Intellectual Property Rights

A notification of Invention has been filed and the patenting process has been started in June 2020. Inventors are the three co -founders: Anna - Luise Devos (former Metze), Xènia Vallès Gamundi and Torben Anker Lenau.

### AnchorGrip Team



#### Anna-Luise Metze M.Sc. Graduate, Founder, CEO Entrepreneurial spirit and project leader

Xenia Valles Gamundi *M.Sc. Graduate*, Founder, Product Developer 3D modeling & printing, user experience design, sport fanatic



Torben Lenau Associate Professor, Ph.D., Supervisor and Mentor

### **Current State**

Elite and Olympic rowers have been testing our product throughout the product development to validate the technology. The technology is in TRL 3. A minimal viable product has been developed.

Nexts steps focus on further testing for improving the technology and develop a subsystem for production in order to get the first batch to market.

### Do you want to join our Team?

We need people, who can help us with the commercial side of the project: Sales, Marketing and Branding.

### Have a chat with us / write to: info.anchorgrip@gmail.com





#### **Contact information** Xenia Valles Gamundi Founder Mobile: 52768924 E-mail: xvgamundi@gmail.com



## Kvasir Technologies Novel Bio-Fuel Platform Technology

# Sustainability & Advanced Materials



### THE PROBLEM

### THE SOLUTION



The current merchant fleet is built to last **20-25 years** But shipping must reduce emissions in **10 years** 



GLOBAL AVAILABILITY AND SCALABILITY

- Use any plant biomass

- Wood, straw, nut shells etc.

#### THE BIOFUEL SOLUTION

Replacing or retrofitting existing is fleet needed € 100MM € 10 MM

New ship (VLCC) Retrofit



Kvasir has a **patented** technology that converts non-edible **plant biomass** into **drop-in marine fuel** 

### **BUSINESS MODEL**

### COMPETITION



SUPPLY

De billion ton p.a.

50-100 €/ton

DECENSION

DECENSION

DEMAND

Do million ton p.a.

Son €/ton

DECENSION

DESINESS MODEL

DEMAND

Demandaria

DEMAND

Do million ton p.a.

Demandaria

Advanced bio-refineries

- License technology 100-500 kton p.a.Co-ownership of plants
- JV with feedstock suppliers

Fossil refineries/oil majors
Feedstock suppliers (consortia)

DROP-IN



Catalytic hydro-pyrolysis and GTL/FT have been omitted due to complexity





### **Current State**

Today: 1l per day steady state trials on continuous setup
2021: Construct pilot facility
2022: First ship trial (20-40 ton oil)
2023: Demo scale (cash flow positive in 2024)
2025: Commercial plant(s)

### **Business opportunity and Call to action**

DTU spin-out formed in 2018 is looking for investors for pilot scale production in 2021.
Kvasir is currently self-financed with DKK 3 million in soft funding attracted so far.
Kvasir is collaborating with D/S Norden, MAN Energy Solutions and Alfa Laval.





#### **Contact information**

Joachim B. Nielsen CEO & Co-founder Mobile: 9398 0775

E-mail: joachim@kvasirtechnologies.com



### Flexibility Enabling Monitoring of **Electric Distribution Networks Enabling Smart Grids**

**Sustainability & Advanced Materials** 

### Power systems are rarely monitored below the 60 kV network



### **Power system challenges**

- Distributed generation

- Electrified services

### **Monitoring challenges**

- Varying data quality
- Privacy concerns
- Processing requirements

### **Business opportunities**

- Transmision and distribution system operators - Grid supporting services from distributed energy resources
- Higher infrastructure utilization
- Improved investment planning

Residential and industrial consumers - Additional revenue streams for distributed energy resources - Increased electrification of services and processes



- Facilitate energy communities

Environment and society

### - Enabling flexible consumption of renewable energy

### **Technology Description**

The proposed technology deals with existing challenges for reliable monitoring of the distribution network part of modern power systems. The technology consist of a two-layered processing platform that handles data acquired from the network both periodically and on an event-driven basis.

With two processors, their individual processing capability requirements are reduced and hence makes the solution feasible for large scale implementation. Such implementation is necessary since distribution networks are like snowflakes, all are unique.

Controlling the lower distribution network part of the power system is ever more necessary for increasing its flexibility. In this respect, controlling without monitoring is like driving a car whilst being blind-folded.

### **Intellectual Property Rights**

Patent application was submitted the 24<sup>th</sup> of June 2019. PostDoc, Theis Bo Rasmussen, and Senior researcher Guangya Yang are the inventors.

### Team



PostDoc Theis Bo Rasmussen DTU Elektro E-mail: thras@elektro.dtu.dk



Senior Business Developer Jørgen Kejlberg DTU Tech Transfer E-mail: joke@dtu.dk

### **Current State**

To date, the technology has been through simulation based test with promising results and we are currently seeking opportunities for real life demonstration. Initial steps for forming a demonstration project are taken together with relevant industry,

showing the potential of the technology.

### **Business opportunity and Call to action**

The team is looking for funding to further mature the technological and commercial foundation, possibly in collaboration with industrial partners.





#### **Contact information** Theis Bo Rasmussen PostDoc @ DTU Elektro Mobile: +45 27829012 E-mail: thras@elektro.dtu.dk

# Sustainability & Advanced Materials

# NORDIC FIREFLY

### We transform daylight to LED light

# Converter electronics enabling high efficient solar powered lighting





### **Products on sale:**

- Firefly 1: For solar driven IOT sensors, and small lighting products
- Firefly 10 : For solar driven lamps, garden lamp size
- Firefly 50 : For solar driven lamps, street lamp size
- Firefly IOT : Communication module for Firefly 1-10-50





### **Technology Description**

NORDIC FIREFLY A/S provides intelligent electronic devices that can store solar energy and reuse it to light up the night. Our technology is so efficient that lamps can work even in periods with limited daylight and long winter nights.

With a unique conversion efficiency that exceeds 96% it is possible to create new reliable solar based light products with maximized LED light output using smaller solar panels and smaller batteries.

Built-in intelligence ensures smart operation of all functions and allows individual' adaptation to various lighting products. Adding a Firefly IOT communication module enables easy communication through the internet or via direct remote control from Apps.

Intellectual Property Rights US 10,381,930 B2, August 2019. THREE-PORT CURRENT CONVERTER

### **Nordic Firefly Team**



CEO Jørgen Kejlberg



CTO Rasmus Ploug



Senior Software Achitect

Stefan Penter

#### **Current State**

NORDIC FIREFLY A/S offer off-the-shelf CE approved electronic systems that can be used as key building blocks for high quality solar driven lighting products.

For lighting manufacturers we offer standard solutions. For project sales and innovative lighting solutions, we provide state-of-art expertise in the development of fully functional electronic systems for solar driven lighting including solar panel, battery and LED modules.

### **Business opportunity and Call to action**

- NORDIC FIREFLY A/S products are on sale, and we are looking for people with market knowledge to scale-up the sales.
- NORDIC FIREFLY A/S is currently maturing the product line in a number of funded projects together with potential customers.

**Contact information** 

Mobile: 42925300

jk@nordicfirefly.com

Title: CEO

E-mail:

Name: Jørgen Kejlberg









**Sustainability & Advanced Materials** 

### **Efficient and scalable semiconductor** switched-capacitor technology for a green future

#### **Power Conversion Demands** Increase on devices that require power ( )**Power in Power out** Power More power conversion is required Converter CO Efficient power conversion minimizes energy losses Scalable power conversion is necessary to matter in the big picture

### **Value Proposition**



	Skycap Stage 1	Skycap Stage 2	Skycap Stage 3
POL	DC-DC	AC-DC	DC-AC
	USD 15.4 billion <sup>1*</sup>	USD 34.9 billion <sup>2*</sup>	USD 95 billion <sup>3*</sup>



### **Technology Description**

Our switched-capacitor power converter integrated circuits can deliver high power, are small, affordable, efficient and scalable. The technology enables the highly integrable advanced and efficient switched-capacitor technology to operate at high voltage and high power. The patented technology developed at DTU replaces several expensive electronic components and chips with a single Skycap chip and a few inexpensive ceramic capacitors.

### **Intellectual Property Rights**

The intellectual property rights are owned by DTU\*:

- **WO2018083242** Covers the core ideas of this technology. Inventors: Pere Llimós Muntal and Ivan Jørgensen
- **US10128746** Covers a control technique for the switched-capacitor power converter. • Inventors: Dennis Øland Larsen, Ivan Jørgensen and Martin Vinter
- **Invention 3**: Work in progress, to be filed at the end of 2020.
- **Invention 4**: Work in progress, to be filed at the end of 2020.
- \*The patents ownership will be negotiated with DTU before spin-off.



Andersen

CEO, Dencrypt

Board

dvisory

4

Pere Llimós Muntal **Assistant Professor** DTU Elektro









Research Assistant DTU Elektro









Frédéric Hasbani **Operations Manager**, ASYGN



Ivan Jørgensen Associate Professor DTU Elektro

**Dennis Øland Larsen** Postdoc DTU Elektro

Postdoc **DTU Elektro** 



### **Current State**

The first proof of concept integrated circuit prototype was designed in 2018 and verified successfully with measurements mid-2019. The second integrated circuit has been designed and sent to fabrication. It will be received and verified by the end of 2020. A third integrated circuit will be designed during the second half of 2020 and Skycap will spin-off at the beginning of 2021.

The focus after spin-off is to prepare the integrated circuits for mass production.



### **Business opportunity and Call to action**

The business will be a fabless semiconductor company supplying integrated circuits that enable our customers to design efficient and small power converters. Our technology has potential to address a wide range of applications in the 145 billion USD annual market of power converters. We first target the 15 billion USD DC-DC market with applications in electrical vehicles, solar powered street lamps, and consumer electronics.

We are raising a first investment round at the end of 2020, so we are interested in investors.





**Contact information** Name: Pere Llimós Muntal **Title: Assistant Professor** Mobile:

E-mail: plmu@elektro.dtu.dk



**Contact information** Name: Dennis Øland Larsen Title: Postdoc Mobile: E-mail: deno@elektro.dtu.dk



### **Sustainability &** RESISTANT POLYNERS Advanced Materials A method for post-polymerization treatment of thiol-ene based plastics



#### 

### Easy and Effective

### **Universal** for **Materials** and **Solvents**





24 h in chloroform



	Pristine	Heat treated
H <sub>2</sub> O	0.5	0
EtŌH	0	0
Isopropyl alcohol	0.5	0
Hexane	0	0
Toluene	0.5	0
THF	5	0
DMF	7.5	0
Acetone	6	0.5
Acetonitrile	12	3
Chloroform	20	0

### Key selling points

- Increased compatibility with harsh chemicals
- Simple and cost-effective methods
- Methods applicable to many commercially available thiol-ene based materials. Can be adapted to a large variety of industrial settings
- Compared to glass, thiol-ene based materials allow flexibility and production at a low cost

### **CHEMICAL RESISTANCE**

- Applicable as coating/adhesive (hard scratch, insulator or protective layer) for medical equipment, electrical equipment or synthesis reactors.
- The technology is especially suitable for microfluidic applications, where it could be an alternative to glass

### **Technology Description**

**Background**: Harsh organic solvents make plastics swell, crack, dissolve or disintegrate. Only few plastics show some resistance to such chemicals, and these are often hard to manufacture, expensive and/or non-transparent. We have developed a method, which makes sulfur-containing plastics compatible with organic solvents.

**The invention:** The present invention relates to a method for enhancing the lifetime and compatibility of thiol-ene based materials with harsh chemicals. We have developed several methods to modify thiol-ene based polymers after the actual polymerization (i.e. post-polymerization). The methods results in high glass transition temperature, dimensional stability, and preservation of optical transparency.

### **Intellectual Property Rights**

European Patent 18184178.4-1107 "Methods for the Treatment of Thermoset Polymers"

### Team









Urs O. Häfeli, PhD

Drago Sticker, PhD

Reka Geczy, PhD

Jörg P. Kutter, PhD

### **Current State**

We have demonstrated that the method improves the resistance of thiol-ene materials to harsh chemicals. We have demonstrated excellent resistance to dichloromethane, chloroform and acetonitrile.

#### **Business opportunity and Call to action** Looking for licensing partner





**Contact information** Name: Klavs Riishede Hansen Title: Senior Commercial Officer Mobile: (+45) 93 56 57 40 E-mail: krh@adm.ku.dk





Sustainability & Advanced Materials

Treating aluminium surfaces with Cu to kill bacteria and virus – and/or forming a conducting copper film on aluminium by electrochemical procedures







### **Technology Description**

Aluminum alloys are electrochemically oxidized (also called anodization) in a process tailored to create a well ordered regular porous oxide layer (10 -50 μm deep pores, pore radii around 100 nm). (See image above.)

These pores are filled with Cu from a solution of copper sulfate in a patented process. If the filling is stopped at the surface, the resulting surface has the looks and finish of normally processed aluminum (greyish, matte or shiny as in the figure above).

If the process is continued, a copper film with roots in the pores may form on top of the surface, like shown in the other image above. This film is electrically conducting and is protected from electrochemical corrosion by the oxide layer on aluminum.

### **Intellectual Property Rights**

European Patent No. 20184136.8 – 1103, filed on 06.07.20. covering Europe. Owner: Syddansk Universitet (SDU). A formal collaboration agreement is signed between SDU and the innovation firm Mion AMST for future marketing, licensing and/or sales.

### Team



Scientific coordinator Per Morgen SDU/Mion AMST



Board member Jens Kristian Damsgaard Science Ventures Denmark



SDU Project officer Bo Nilsson SDU RIO



Project manager Kim Ladefoged Mion AMST



Finance and marketing Jesper P. Olsen Mion AMST



Technical support NN SDU/Mion AMST

### **Current State**

The signed agreement between SDU Ventures and Mion AMST calls for fabrication of smaller, functioning prototype items, such as toilet buttons or door handles and for documentation of the specific antimicrobial effects, life-time estimates, process costs and estimates of upscaling costs and parameters (voltages and currents, and chemicals a.o.). Potential users/customers in the health and hygiene sectors are contacted, and partners in companies with larger scale production capabilities and penetration of the marked have signed agreements for assisting in the next phase of the developments.

### **Business opportunity and Call to action**

First-mover customers (like hospital equipment manufacturers) are invited to participate in the production and refining of the processes for functioning prototype equipment. In this phase, funding is required and critical for acquiring larger scale equipment and processing facilities in the laboratories, and for access to larger scale processing available at contracted industrial partners (metal distribution -, anodization and galvanization companies).







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### **BETTER FERTILIZERS, BETTER CROPS AND A BETTER ENVIRONMENT**

### **Sustainability & Advanced Materials**

Mitigation of ammonia, odor and greenhouse gases from animal manure

### Value proposition

We increase fertilizer nitrogen in manure by adding a proprietary mixture of compounds making more nitrogen available for obtaining higher crop yields and increased protein content. Simultaneously, we reduce ammonia, odor and greenhouse gas emissions.



**Field application** 

### Livestock housing

### Manure storage

### **Technology Description**

Industrial agriculture produces large amounts of manure slurry from intensive animal productions. Biogenic gaseous emissions from manure slurry give rise to numerous environmental and societal concerns. Emissions of ammonia and methane present an economic challenge to farmers as well as contributing to climate change.

The product relates to an environmentally friendly formulation of tannic acid and fluoride (e.g. NaF) which can synergistically reduce/mitigate the transition of urea to ammonia in e.g. manure slurry. Simultaneous emissions of methane and odor is also reduced. Thus, the combination of tannic acid and fluoride can reduce ammonia, methane and odor emissions from e.g. animal manure slurry or urea-fertilizers reducing loss of fertilizer nitrogen, impact on ecosystems and contribution to climate change.

### **Intellectual Property Rights**

Priority application filed 12 June 2019. Patent application is currently in PCT phase with all claims regarded as novel and inventive by the EPO examiner.

### Team



Professor WSR, PhD Henrik Karring



Assistant Professor, PhD Simon Svane



Postdoc, PhD Jens Jakob S. Gade



Associate professor, PhD Anders Feilberg



Postdoc, PhD Frederik Dalby



Senior Advisor, PhD Michael J. Hansen

### **Current State**

The use of tannic acid and fluoride to reduce ammonia emissions has been tested in manure slurry from pigs in a laboratory environment. Next steps are:

- Demonstrate reduction of ammonia emissions from other animal manure
- Demonstrate technology in larger scale such as stables and slurry tanks (ongoing)
- Demonstrate compatibility with biogas production
- Demonstrate improved fertilizer value of the manure through field trials

### **Business opportunity and Call to action**

In Denmark alone, 35 million tons of manure are produced annually and only 18% of those are treated by ammonia reducing technologies today. We believe our technology is superior to existing technologies and can reach broad market penetration.

We are looking for partners to co-develop the technology towards commercialization, especially large-scale testing of the improved fertilizer value in field trials.





**Contact information** Tore Junkuhn Dehli **Business Developer** +45 9350 7373 tode@sdu.dk



# Sustainability & Advanced Materials

# ClearSKY Imagery

Cloudless Imagery

**High Precision** 

Strong Reliability

### **Daily Satellite Imagery**

Without Clouds and Shadows



### **Technology Description**

Satellite imagery has numerous use cases in the fields of environmental monitoring, map making and meteorology. For many of these use cases both clouds and shadows are an issue, as they hinder the visibility of the landscape. This problem is especially big in the northern hemisphere, where the weather is cloudy more often than not. In many cases this results in weeks or months between new cloud-free images of any given location.

At ClearSky Imagery we solve this problem by using radar technology and artificial intelligence to remove clouds, shadows and other inconsistencies from satellite images and recreate the underlying landscape. We recreate all relevant bands from the European Space Agency's Sentinel-2 satellites, which are used in many industries.

### **Intellectual Property Rights**

We have no patents or other protected intellectual property due to the nature of our service.

### The Team

![](_page_9_Picture_14.jpeg)

Co-founder & CEO Morten Fjord Pedersen

### **Contact Information**

Web: <u>www.clearskyimagery.dk</u> Email: <u>mfp@clearskyimagery.dk</u>

![](_page_9_Picture_18.jpeg)

Co-founder & CTO Malthe Dahl Jensen

### **Current State**

Our stage of development is prototyping. We have already developed our prototype cloud remover, automatic data pipelines, cloud and shadow detection, and are currently finishing our API data access. We are a few months away from being able to produce and deliver our cloudless imagery to stakeholders and other interested parties. ClearSky is currently focusing on daily cloudless multi-spectral satellite imagery of Denmark and will soon be expanding to Europe. We are currently funded by Innovation Fund Denmark.

### **Business opportunity and Call to action**

We are creating a subscription-based company to provide up-to-date imagery without clouds on a daily basis. We are currently looking for commercial/industrial partners in agriculture, forestry and urban monitoring, to validate our cloudless images through testing. Within sustainability this can be to what extend up-to-date information can help earth and climate change monitoring. Or how much frequent images can benefit the existing sustainability tools, analysis and governmental oversight.

![](_page_9_Picture_24.jpeg)

![](_page_9_Picture_25.jpeg)