

DAM  RPHE



tunisian talents united


DAM  RPHE

**A Nano-Technology Company for
a Sustainable Energy Future**

DAMORPHE

BRAND | Materials IP Holding Company



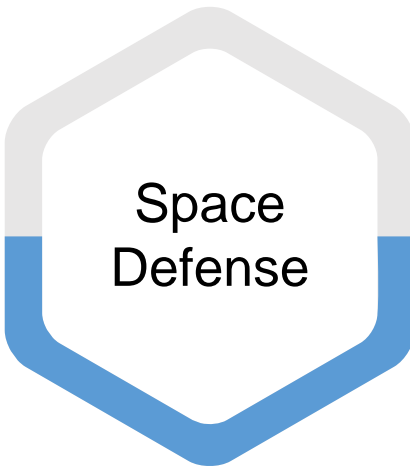
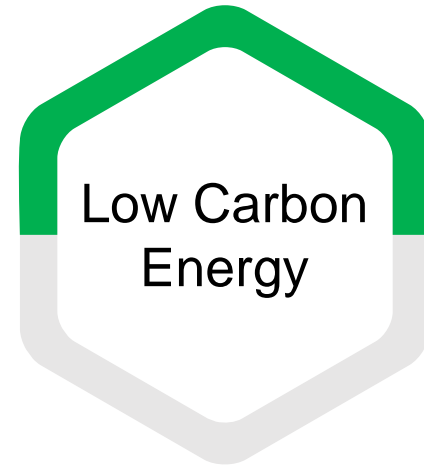
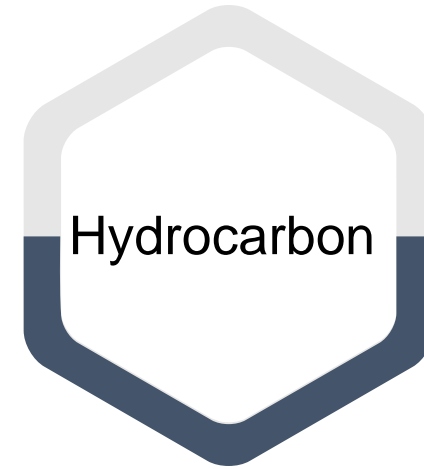
OUR MISSION

To transform the world through disruptive innovation with intelligent products that advance human wellbeing.



OUR VISION

To be the technology company of choice for creation of intelligent products with a social conscience matching our innovative DNA.



The multi-national DAMORPHE team



KAMEL BEN NACEUR
CHAIRMAN



TING ROY
PRESIDENT & CEO



INDRANIL ROY
CTO



Kenneth Summer
Director



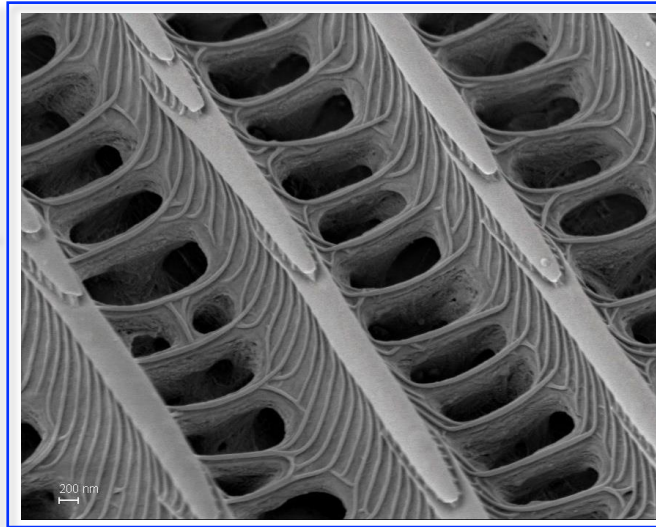
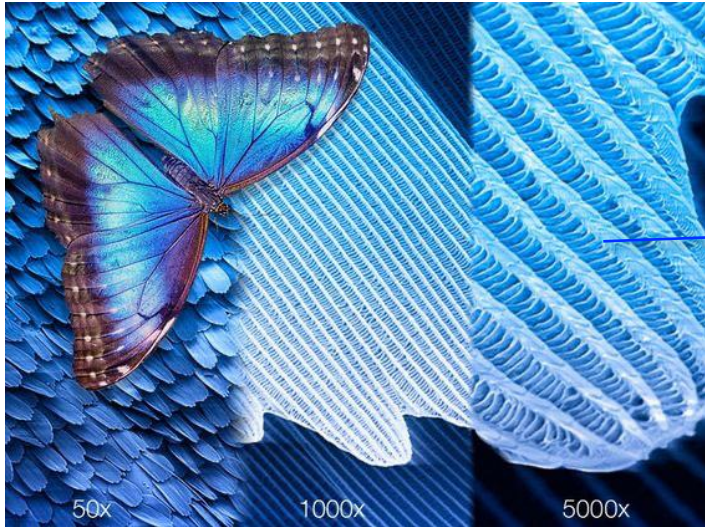
HIFZI ARDIC
DIRECTOR



NAJOUA BEN NACEUR
DIRECTOR



Biomimetics | Nano-Materials, Inspired By Nature



Dyes Free Color
Light creates color without pigments

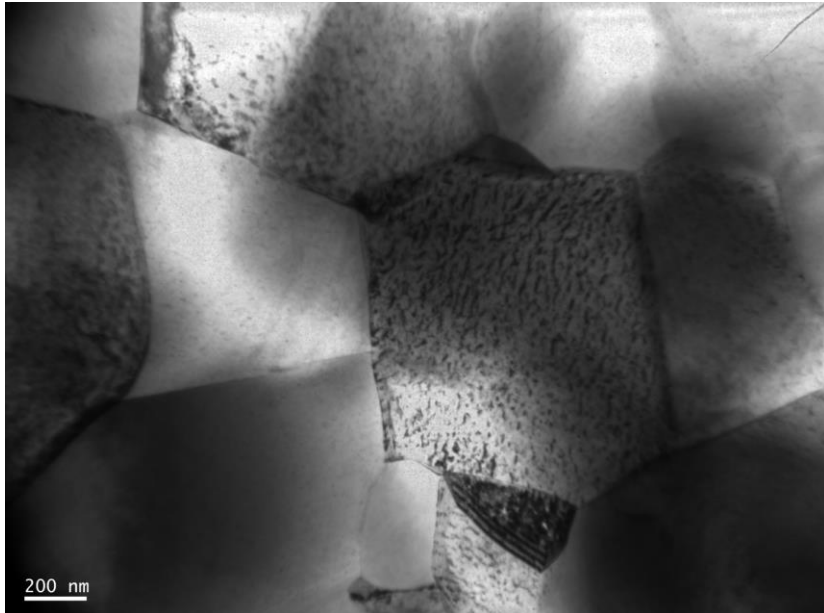
Water Repellent
Super Hydrophobic Wing Structure

500 μm | Butterfly Wing

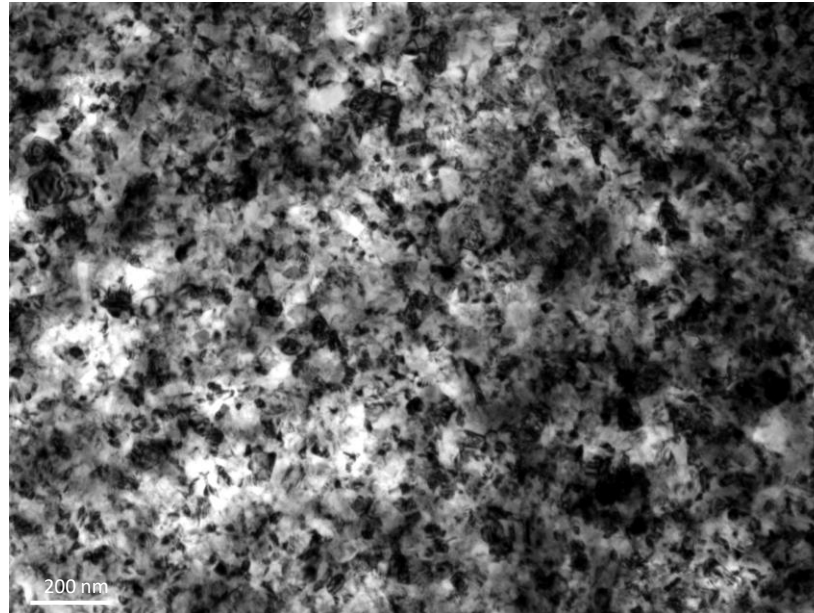


Self Cleaning Fabrics
nano-Composites

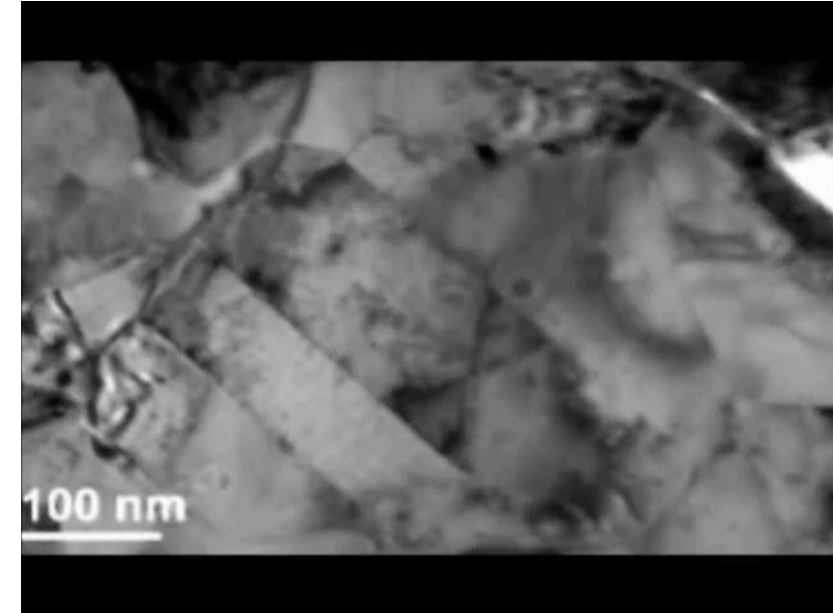
Inspired by Nature | Designed by Us



Ultra-Fine Grained
Microstructures

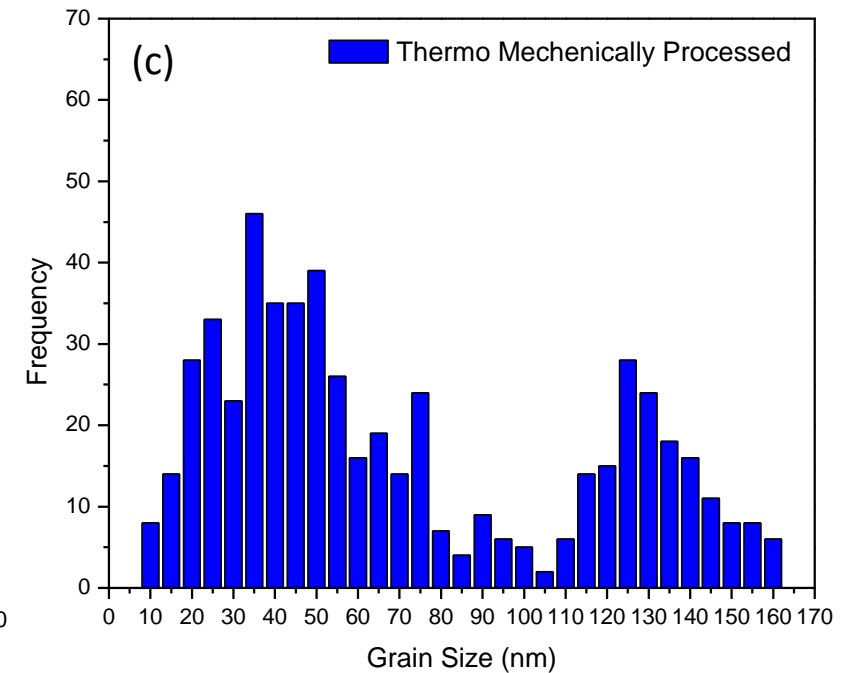
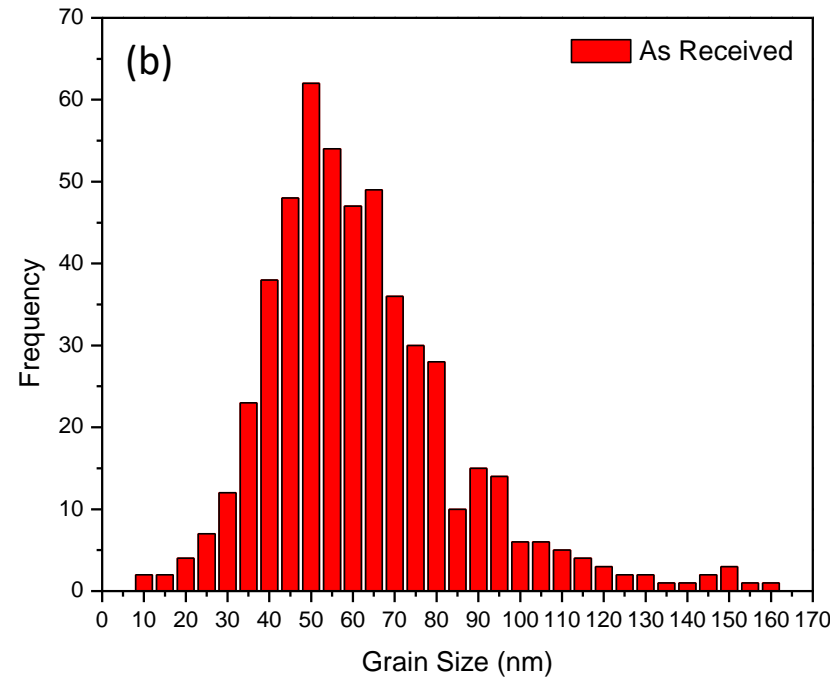
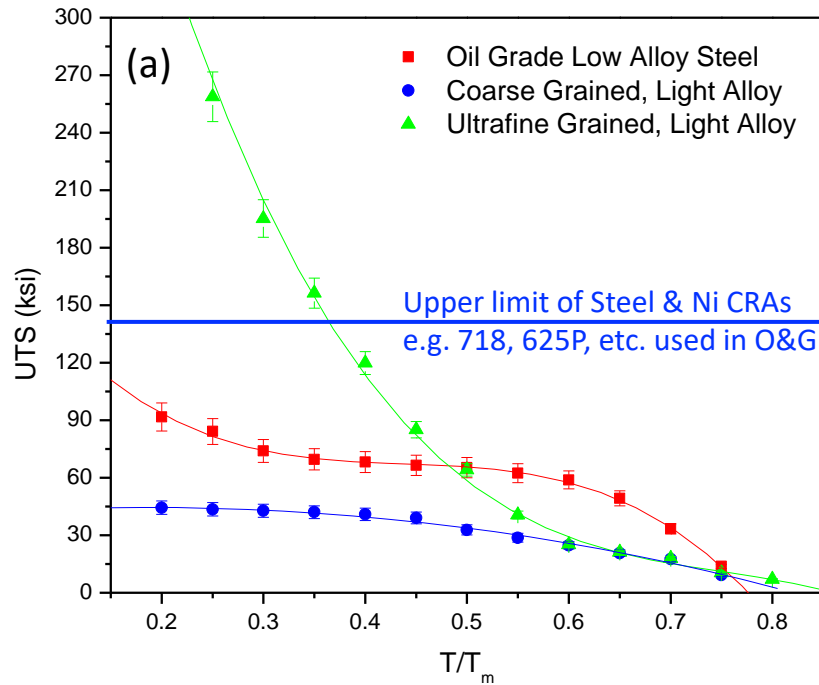


Nano-structures
Grain Size < 100 nm



Understanding deformation
TB Induced Work Hardening

Extraordinary Strengths of Nano-Materials



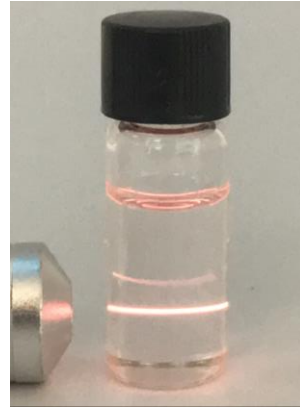
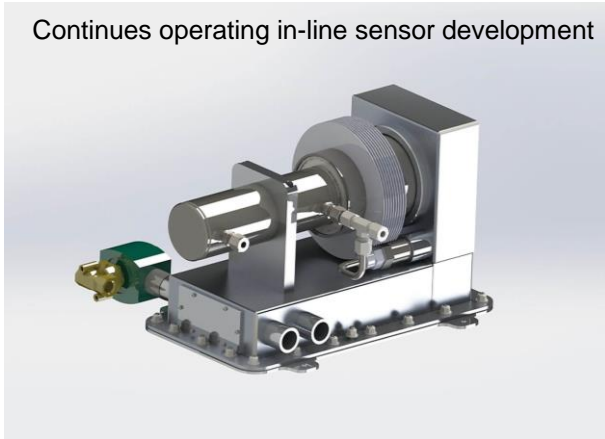
Temp. derating of nc-alloy vs. coarse grained alloy

Grain size statistics. Thermo-mechanically engineered bi-modal grains to increase ductility ($\% \epsilon$) in nc-alloy

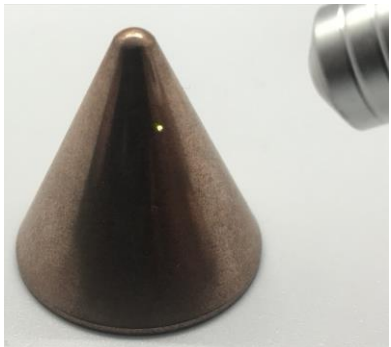
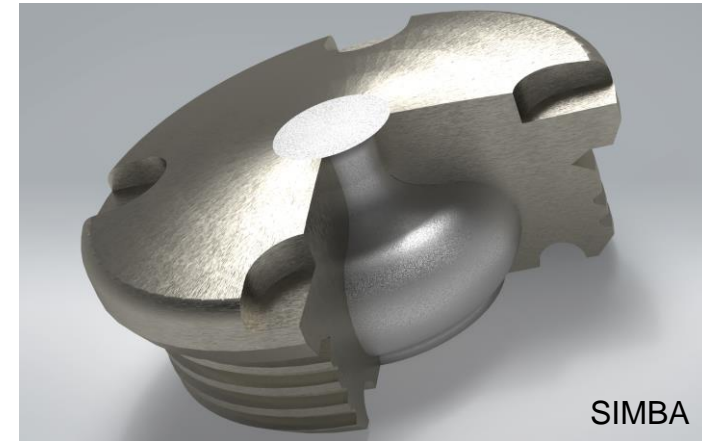
Integrated Meta-Materials with Nano-Particles as Tracers

META-MATERIALS WITH NANOPARTICLE-TRACERS FOR REMOTE MONITORING

Continues operating in-line sensor development



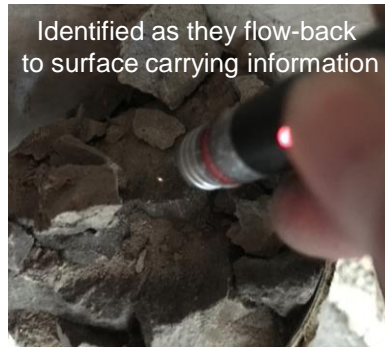
FROM BIO-MEDICAL TO AGRITECH TO ENERGY TO DEFENSE & OTHER(S)



CLEAR HEA Liner with Tracers



Shot in cement target



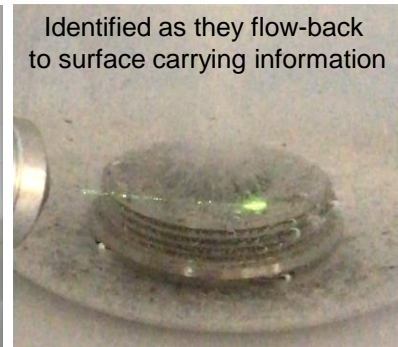
Identified as they flow-back to surface carrying information



Remote identification by X-Ray / MRI



Gen-II smart SIMBA with tracer



Identified as they flow-back to surface carrying information

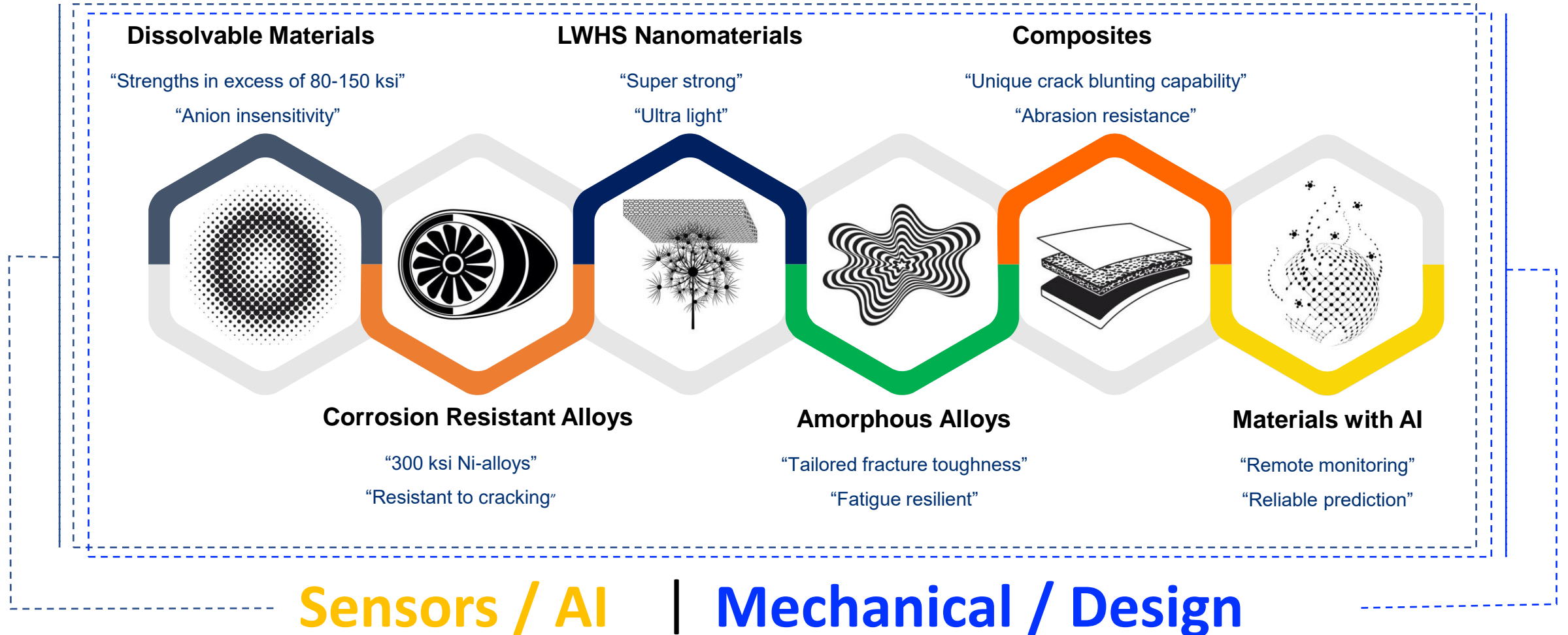
Tracers released as plug dissolves

Nano-crystals, of tailored shapes, sizes and electronic structures, emitting unique photonic fingerprints when illuminated by collimated light sources are integrated in our meta-materials as tracers. Exhibits unique absorption spectra and engineered decay-times based on their optical, physical, and other properties. Identifiable in parts-per-billion dilution by custom designed spectroscopic detectors (in-flow detector - under development).

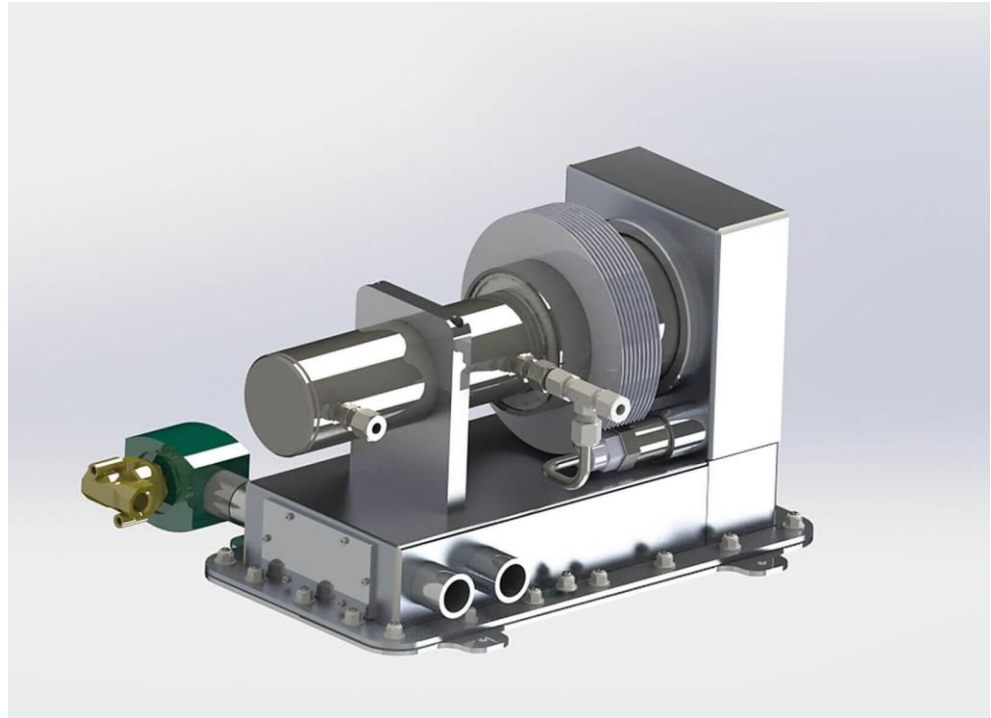
DAMORPHE – Center for Materials Excellence



DAMORPHE – CME

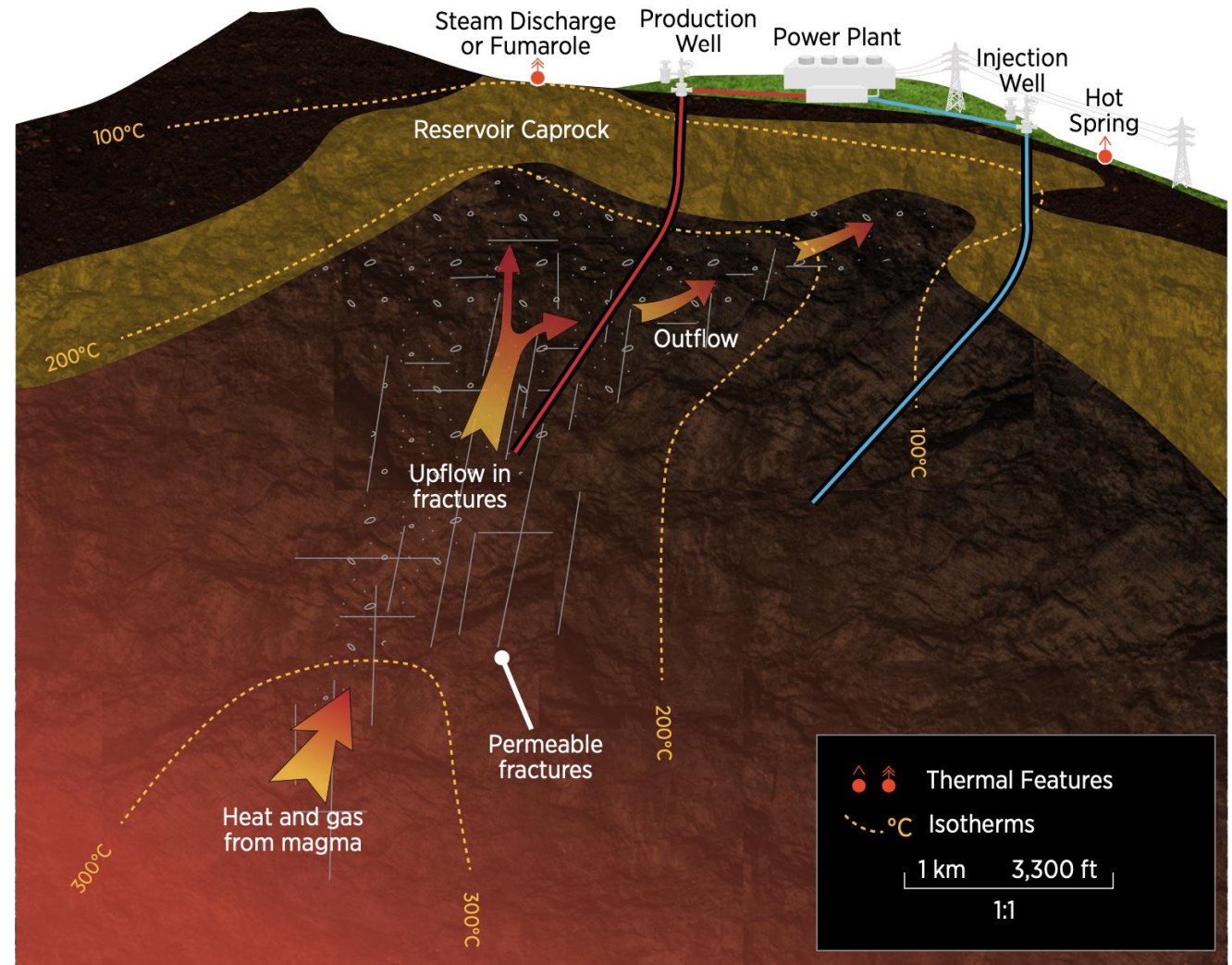
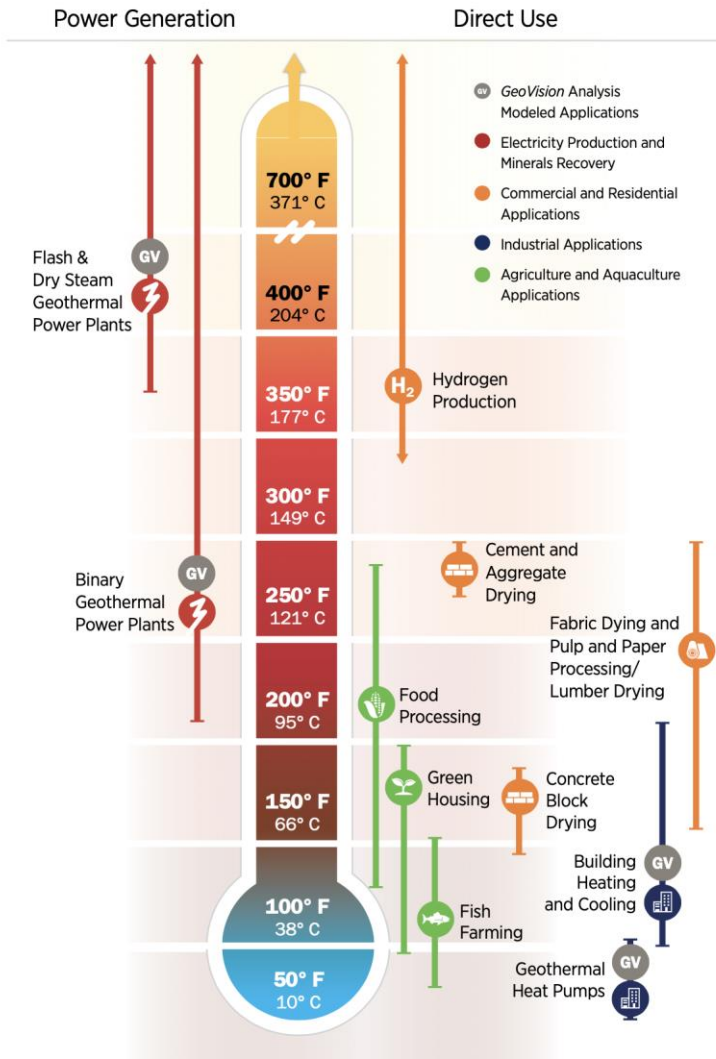


Identifying Sources of Environmental Pollution

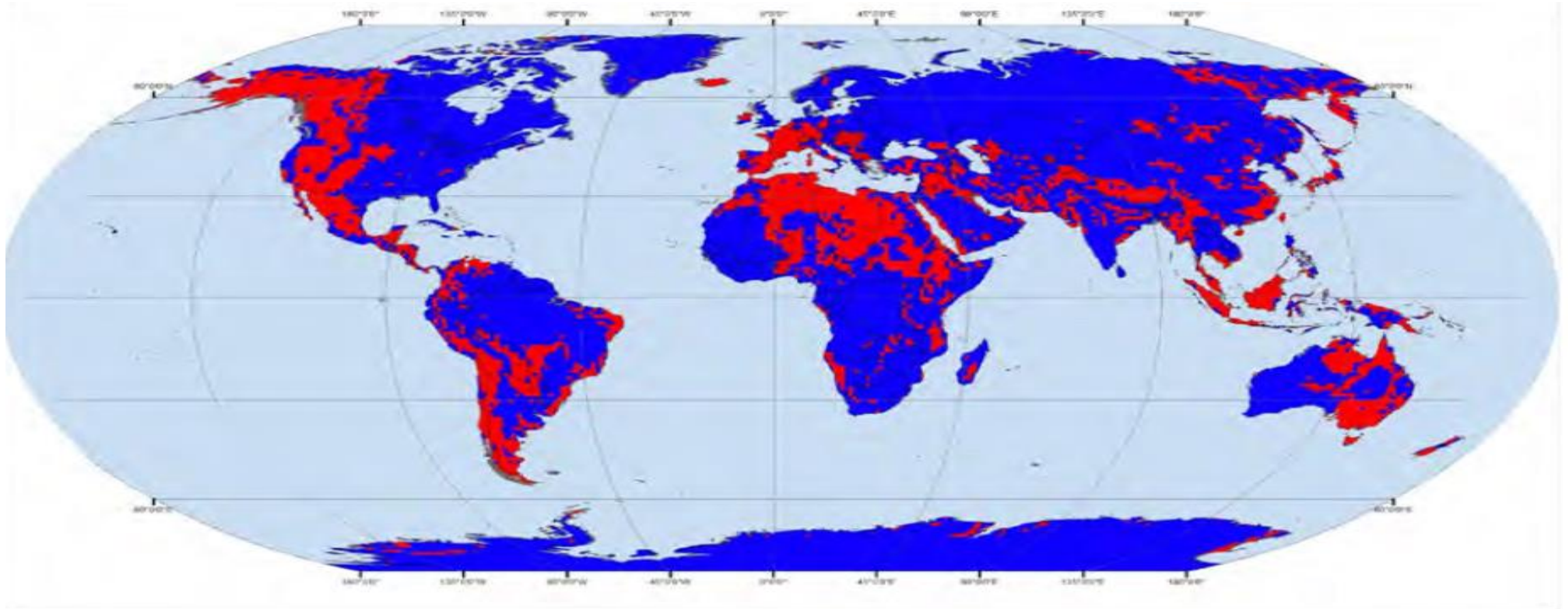


To be installed as devices from chemical discharge vents to storm drains with remote monitoring for released tracers, data transmitted to EPA or monitoring authority.

Geothermal Energy



Super Hot Rocks Distribution



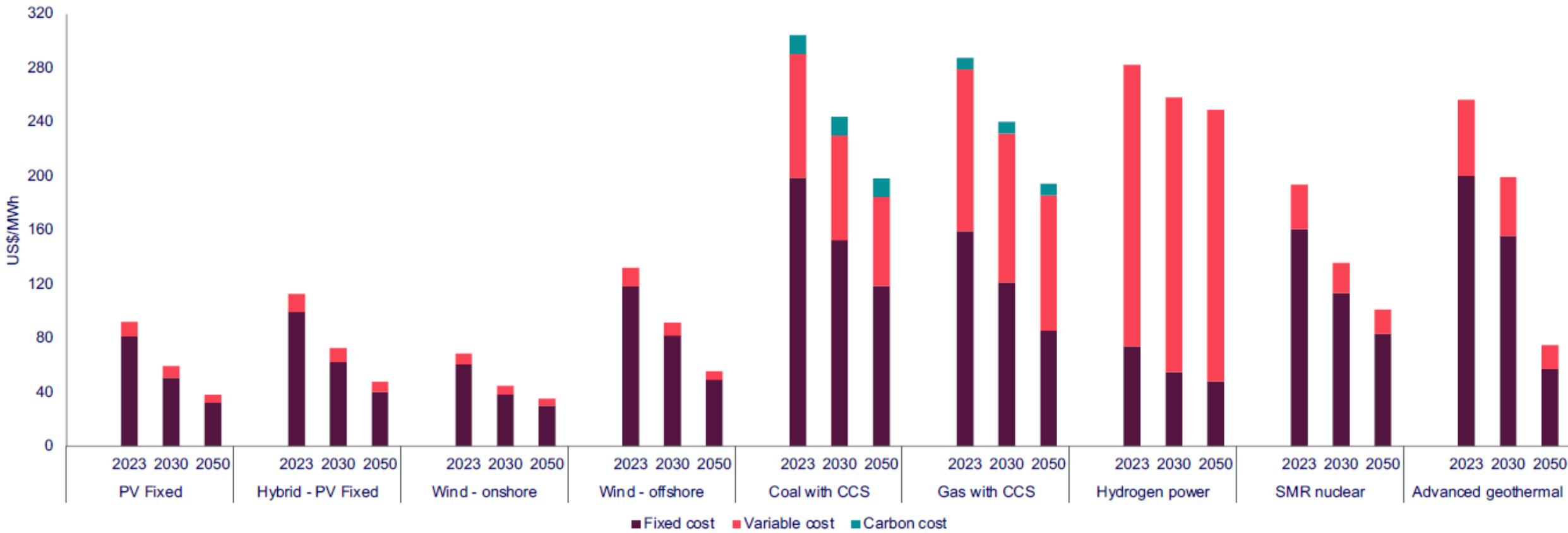
Depth of Isotherm 450C (km)



Source: CATF, 2023

Geothermal: A Compelling Option vs Nuclear, CCUS, H₂

Levelised cost of electricity, Europe, US\$/MWh (real terms)



Source: WoodMcKenzie, 2023

ENERGY TRANSITION THROUGH TECHNOLOGY SYNTHESIS

Systems Engineering for Enhanced Geothermal Systems, Supercritical CO₂ and SAGD



日本財団-DeepStar 連携技術開発助成プログラムに採択
超臨界型 EGS で使用可能な熱安定性に優れた耐食合金および熱
水貯留層内における密閉技術に関する共同開発を開始
～大深度層での地熱発電を実現する技術開発を推進～

日本財団-DeepStar 連携技術開発助成プログラムに採択
～大深度層での地熱発電を実現する技術開発を推進～

大同特殊鋼株式会社(社長:石黒 武)は、「海洋石油・天然ガス分野における脱炭素化推進に係る日本財団-DeepStarTM連携技術開発助成プログラム」に超臨界型EGSTM(Enhanced Geothermal System: 強化型地熱発電システム)で使用可能な熱安定性に優れた耐食合金およびそれらを用いた密閉技術開発をテーマに申請し、技術開発事業の執行団体である公益財団法人日本財団により採択され、2022年6月1日より本プログラムを開始しました。

背景

カーボンニュートラル実現に向けた再生可能エネルギー導入拡大の観点から、石油などの地熱性エネルギー資源を利用せず、季節や天候、昼夜を問わず一定の電力を供給できるクリーンな電源として、地熱発電に注目が集まっています。しかしながら、従来の地熱発電はプラントの建設期間が長く開発コストが高いことや、発電に適した熱水貯留層^①を有する土地に限られることなどから、世界的に普及が進んでいません。

このような普及阻害要因のブレイクスルー技術として、EGSに世界的な注目が集まっています。EGSは人工的に作り出した熱水貯留層を利用するため、これまでより発電場所の候補地を増やすことができます。また、近年の掘削技術の進歩で掘削の大深度化が進んでおり、将来的には海底地下の大深度層における高い熱エネルギーを利用した、大出力の地熱発電の開発も期待されていることから、地熱発電が有望な開発対象になりつつあります。

一方で、大深度のEGSには高温かつ強い腐食環境に耐える材料開発が課題として挙げられます。特に早期実現が期待される超臨界型EGSは、従来の地熱発電より深い熱水貯留層が活用され、高温かつ塩化物イオンや硫化水素を含有する腐食性の高い地下水と接するため、構成材料には耐食性に優れた材料が必要になるとともに、過熱な環境である熱水貯留層内における密閉技術の開発も必要となります。

採択された開発テーマの概要

目的

超臨界型EGSで使用可能な熱安定性に優れた耐食合金を開発し、それらを使用した密閉技術を開発する

内容

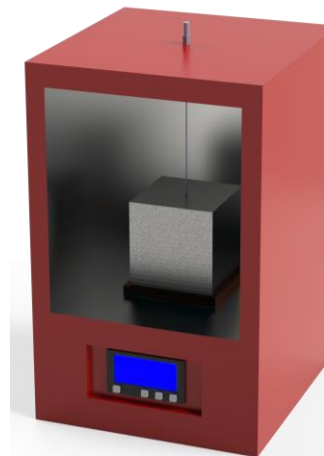
大同特殊鋼株式会社(パッカーTM)に用いる耐食合金の開発を実施し、パートナー企業である米国のDamorphe社の密閉技術開発と組み合わせ超臨界型EGSで使用可能なパッカーの開発を行います。



2022-2024 NIPPON Foundation/DEEPSTAR Awardee

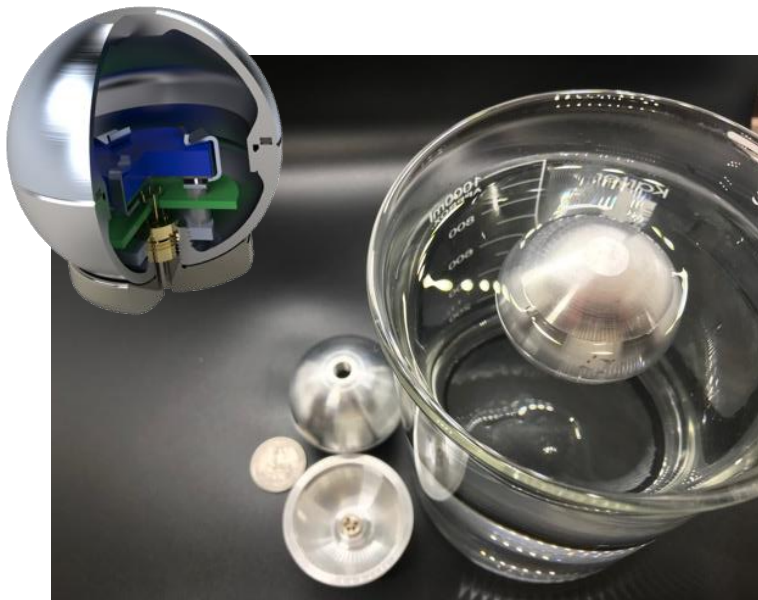


750 °F EGS Packer



Press Release October 12th 2022: Daido (https://www.daido.co.jp/about/release/2022/221012_egs.html)

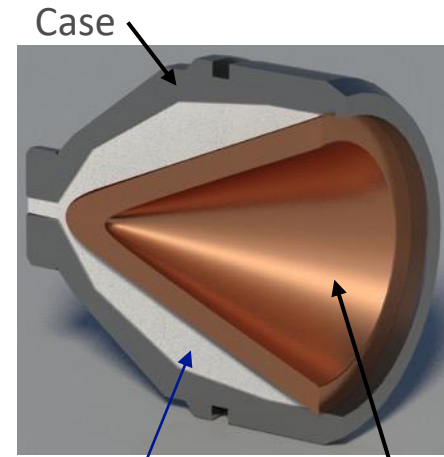
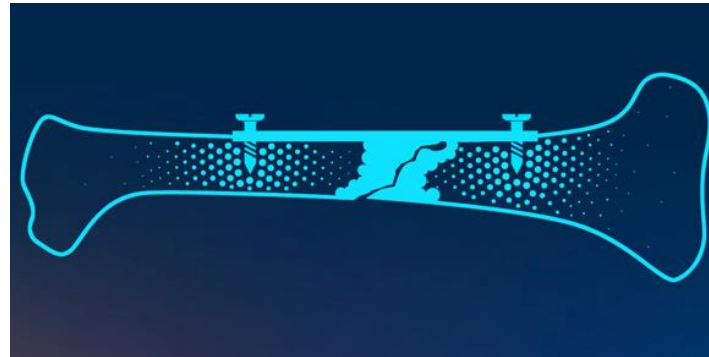
Technology Synthesis & Cross Pollination



From LWHS Flowable Sensors to Human Engineering, Prosthesis with AI



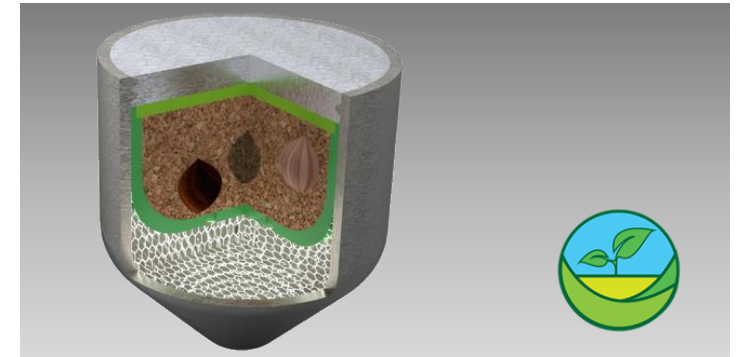
From Bulk Metallic Glass Nozzle Plugs to Human Engineering, Bioabsorbables



High Explosive (RDX, HMX, HNS)



From Carbon Footprint, Dissolvable Charges to Carbon Neutral, Smart Biodegradable Pods



ADIPEC 2021 Awardee, only 2 years after starting



جوائز أديبك
ADIPEC AWARDS
EXCELLENCE IN ENERGY 2021

2021 Categories | FAQs

أدنوك
ADNOC

THE ADIPEC AWARDS 2021 FINALISTS

<p>BREAKTHROUGH RESEARCH OF THE YEAR</p> <ul style="list-style-type: none"> • ADNOC & MicroSilicon: Real-time Asphaltene Detection Sensor using Quantum RF: A paradigm shift making reactive processes • Saudi Aramco: Saudi EXO-STORM Technology to Enhance Oil Production • Shell Catalyst & Technologies: Shell Blue Hydrogen Process 	<p>BREAKTHROUGH TECHNOLOGICAL PROJECT OF THE YEAR</p> <ul style="list-style-type: none"> • ADNOC: Non-metallics: Disruptive Materials for Longer Assets Life Cycle • L&T Hydrocarbon Engineering: Implementation of Full Automation in Haliba Development Project - The First Ever in GCC • Shell: Robust Well Location Optimization Technology
<p>DIGITAL TRANSFORMATION PROJECT OF THE YEAR</p> <ul style="list-style-type: none"> • ADNOC: Thamama Center - The Digital Transformation Hub of ADNOC Upstream • ADNOC & Datagration: 10x Portfolio Optimization & Opportunities - Maximize Asset Value from existing resources • Saudi Aramco: Futuristic technology powering world's largest intelligent oil field 	<p>SOCIAL CONTRIBUTION AND LOCAL CONTENT PROJECT OF THE YEAR</p> <ul style="list-style-type: none"> • OMV Petrom: Romania plants for tomorrow • OMV Petrom: Oilmen's School • Saudi Aramco: In-Kingdom Total Value Add Program (iktva)
<p>OIL AND GAS INCLUSION AND DIVERSITY COMPANY OF THE YEAR</p> <ul style="list-style-type: none"> • ADNOC: ADNOC Onshore Diversity & Inclusion: Powering Innovation & Sustainability for Competitive Advantage • ADNOC: THRIVE Culture Program - A collaborative, cross functional program for a thriving Bourouge • Emerson Automation Solutions: Emerson's Diversity & Inclusion Programs and Initiatives 	<p>YOUNG TECHNICAL PROFESSIONAL OF THE YEAR</p> <ul style="list-style-type: none"> • ADNOC: Fatima Yousif Al Suwaidi • Saudi Aramco: Mohammad Aljurban • Saudi Aramco: Bashayer Aldakkan
<p>INNOVATION IN DECARBONISATION COMPANY OF THE YEAR</p> <ul style="list-style-type: none"> • Baker Hughes: Baker Hughes, Taking Energy Forward: Our Decarbonisation Story • Saudi Aramco: Innovation in Decarbonisation • Siemens Energy: Innovating the Energy Transition: Forging a net-zero future from fossil fuels to renewables 	<p>OIL AND GAS START-UP COMPANY OF THE YEAR</p> <ul style="list-style-type: none"> • DAMORPHE INC: DAMORPHE, an innovative technology start-up • Data Gumbo: Data Gumbo to Lead Smarter, Faster, Leaner and Greener Future for Oil & Gas • ResFrac Corporation: ResFrac evolving the modeling landscape to support a culture of continuous improvement

Top 3 Start-ups | 700 Applicants, 50 Countries

Summary

- DAMORPHE is an advanced materials company, focusing on the application of nano-technology, with sustainability in its DNA
- Nano-technologies are inspired by nature
- Applications have started in the oil and gas industry, and now moving to low carbon energy, such as geothermal and wind
- Some of the technologies developed are also considered for use in the medical and the agricultural sectors
- The technologies are being commercialized in the United States, Canada and UAE, with expansion to other regions, such as the Africa and Latin America
- DAMORPHE is an example of nationally diverse, and geographical spread team with members from Tunisia, China, India, Turkey, USA, France and Brazil

DAM  RPHE



tunisian talents united


DAM  RPHE

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