

DAM  RPHE



DAM  RPHE

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

DAMORPHE

BRAND | Materials IP Holding Company



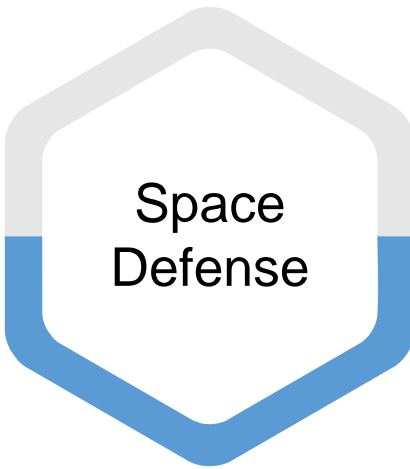
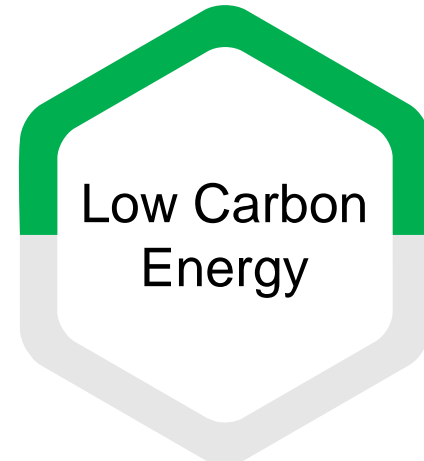
OUR MISSION

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



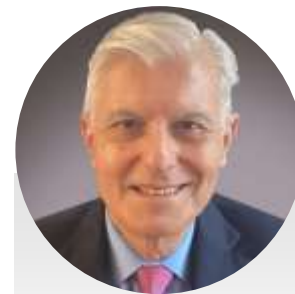
KAMEL BEN NACEUR
CHAIRMAN



TING ROY
PRESIDENT & CEO



INDRANIL ROY
CTO



HIFZI ARDIC
DIRECTOR



NAJOUA BEN NACEUR
DIRECTOR



Officers & SBU Ind. Directors



CHRIS WILKINSON
COO



JING ZHOU
IND. DIRECTOR



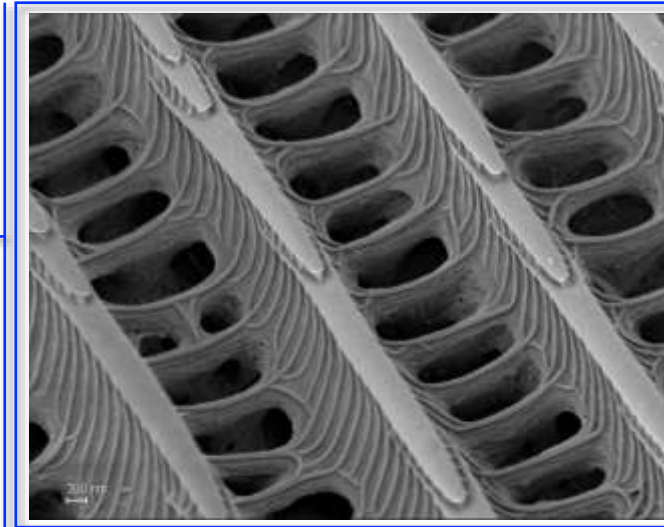
GUSTAVO GRULLON
DIRECTOR, HFRAC



RAM SHENOY
DIRECTOR, HFRAC



Biomimetics | Nano-Materials, Inspired By Nature



Dyes Free Color
Light creates color without pigments

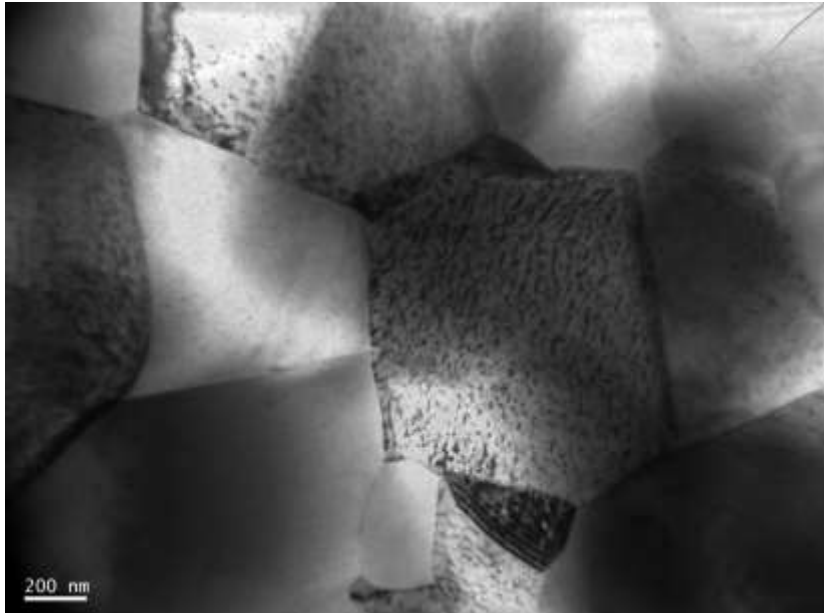
Water Repellent
Super Hydrophobic Wing Structure

500 μm | Butterfly Wing

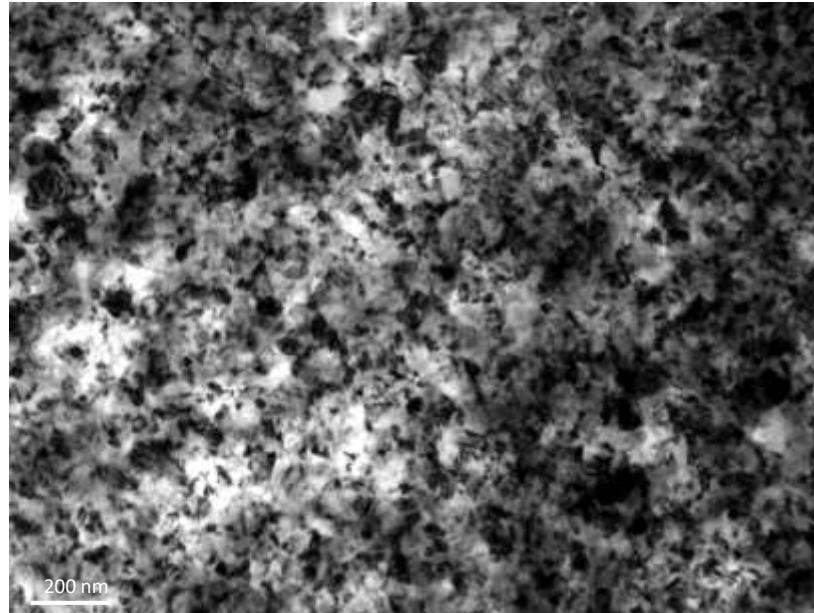


Self Cleaning Fabrics
nano-Composites

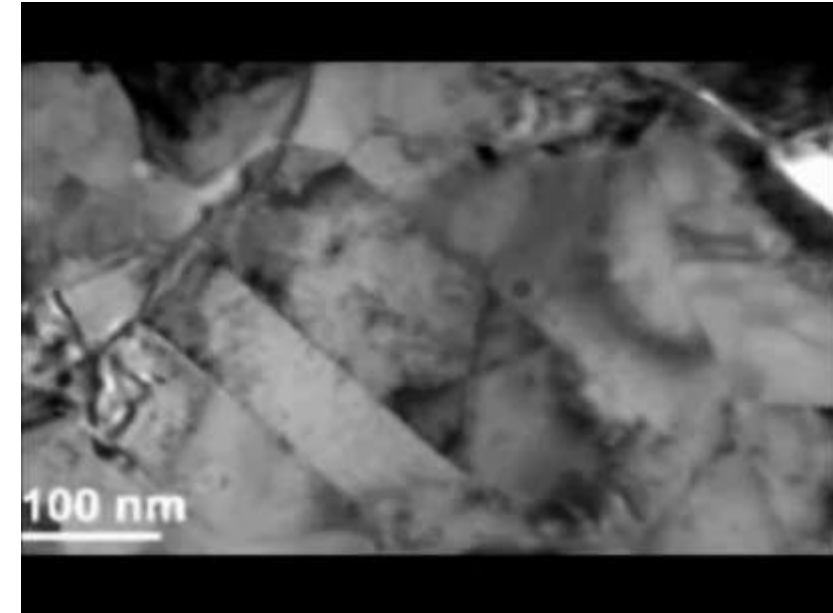
Inspired by Nature | Designed by Us



Ultra-Fine Grained
Microstructures

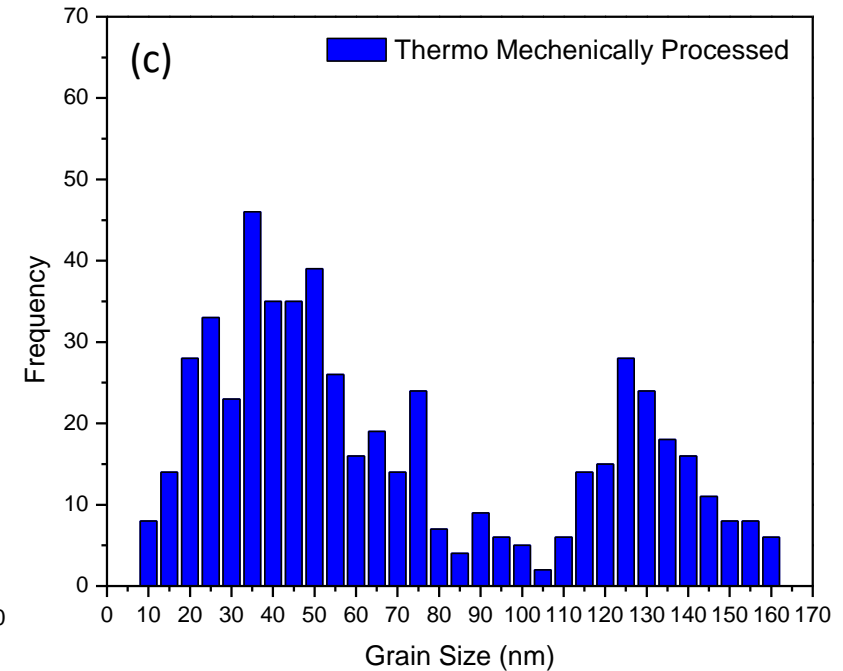
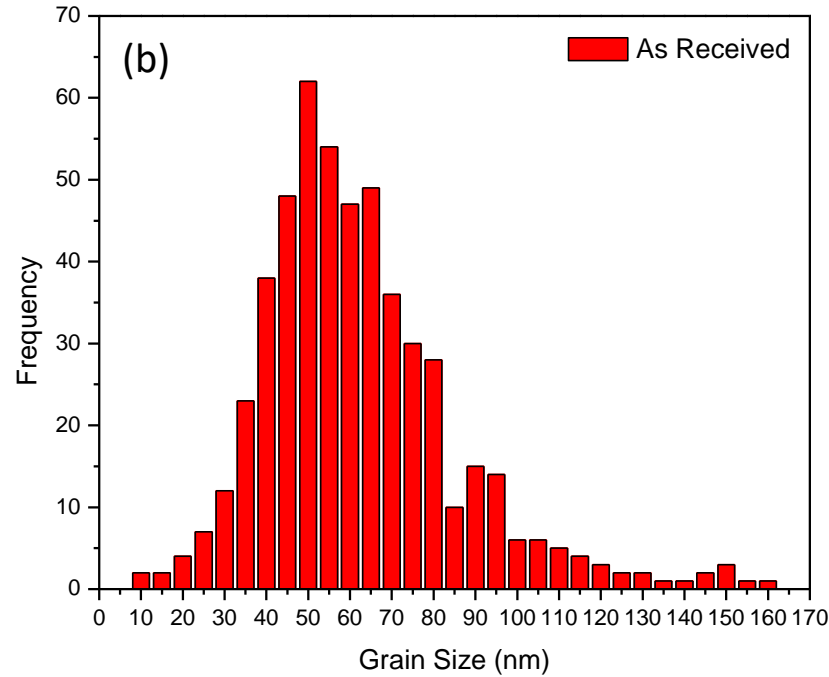
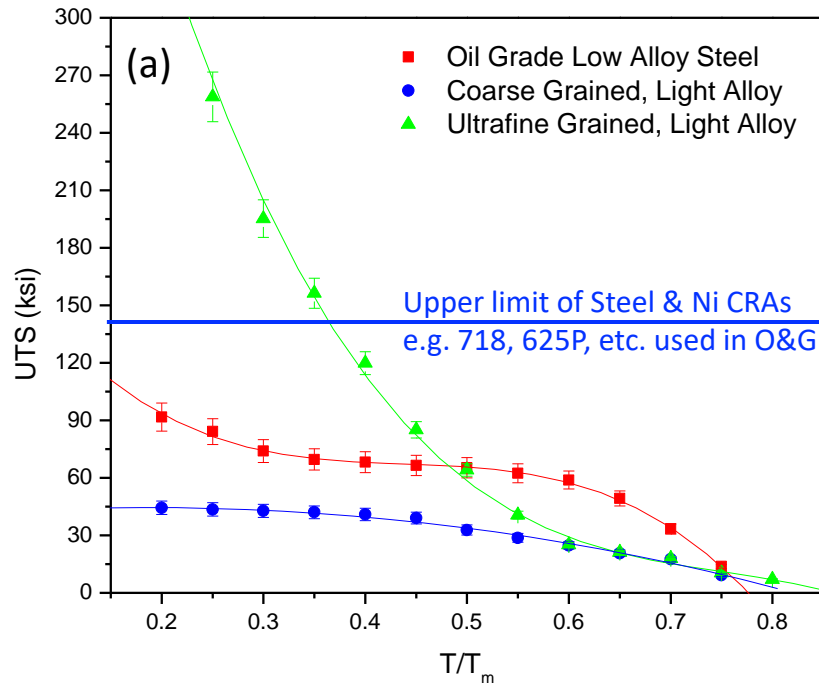


Nano-structures
Grain Size < 100 nm



Understanding deformation
TB Induced Work Hardening

Extraordinary Strengths of Nano-Materials



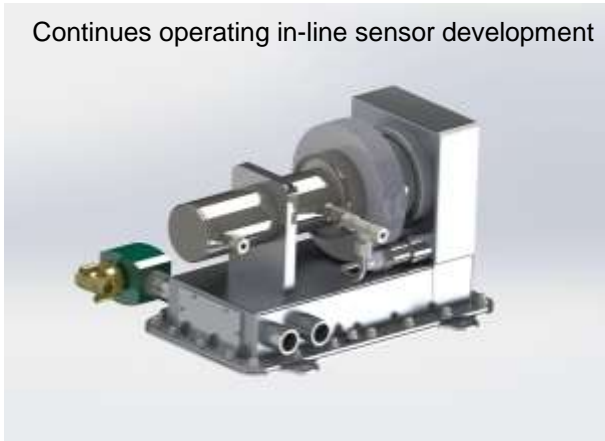
Temp. derating of nc-alloy vs. coarse grained alloy

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)



SIMBA



CLEAR HEA Liner with Tracers



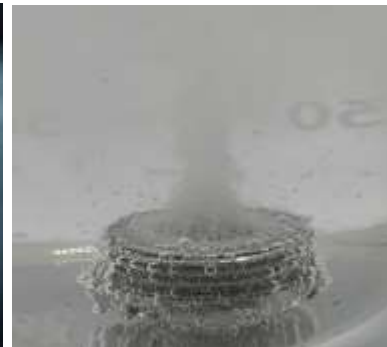
Shot in cement target



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).

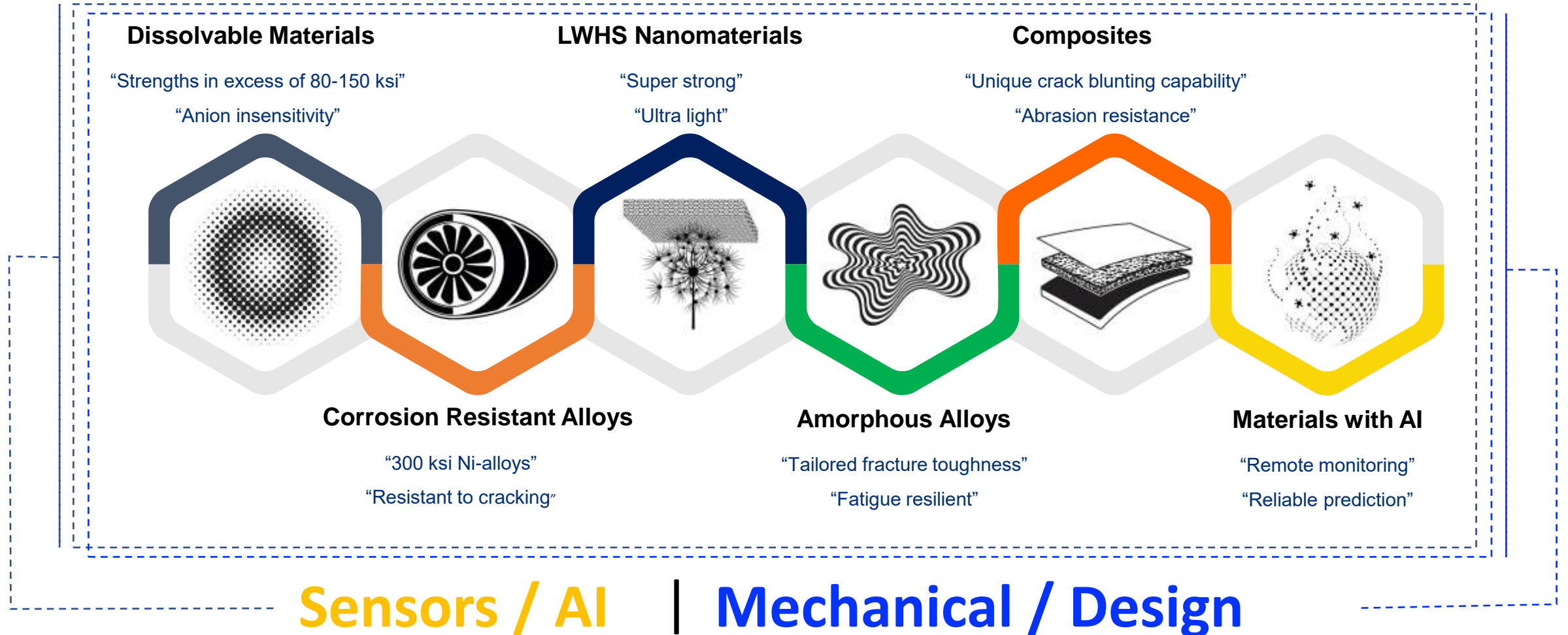
Nano-Particle (Tracers)



DAMORPHE – Center for Materials Excellence



DAMORPHE – CME

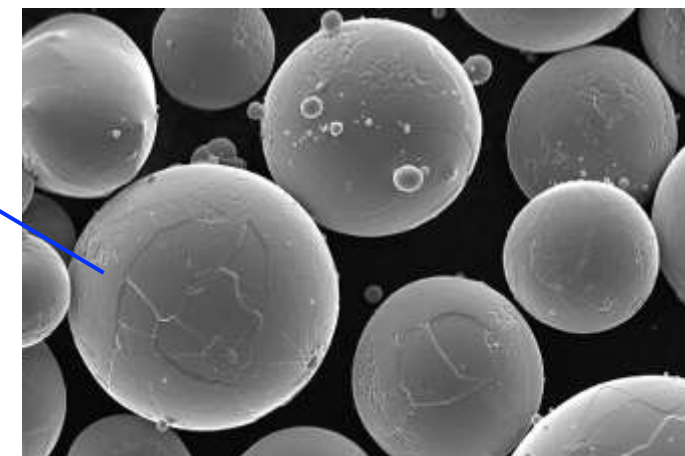


A Shaped Charge Like No Other

LARGE EHD; LOWER PERF. FRICTION; HIGHER C_d & CLEAN PERF. TUNNEL

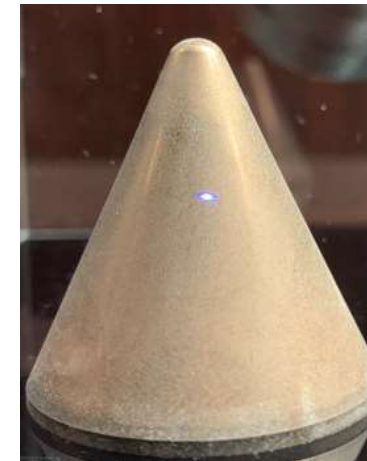
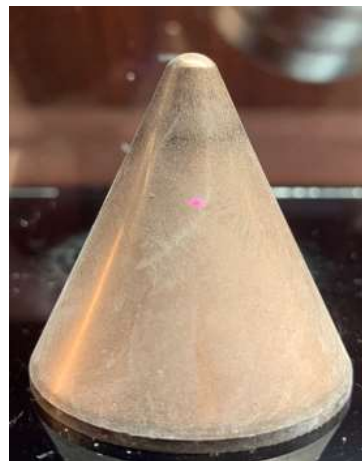
The ONLY Charge with a Degradable High Entropy nano-Composite (BMG) Alloy Liner

Shot from a $3\frac{1}{8}$ inch Gun: GEN-I Offering 0.55-inch Up-to 0.7-inch EHD



Designing dissolvable alloys with matrix stemming from most elements in periodic table

Tracers Integrated in Liner



Patents pending

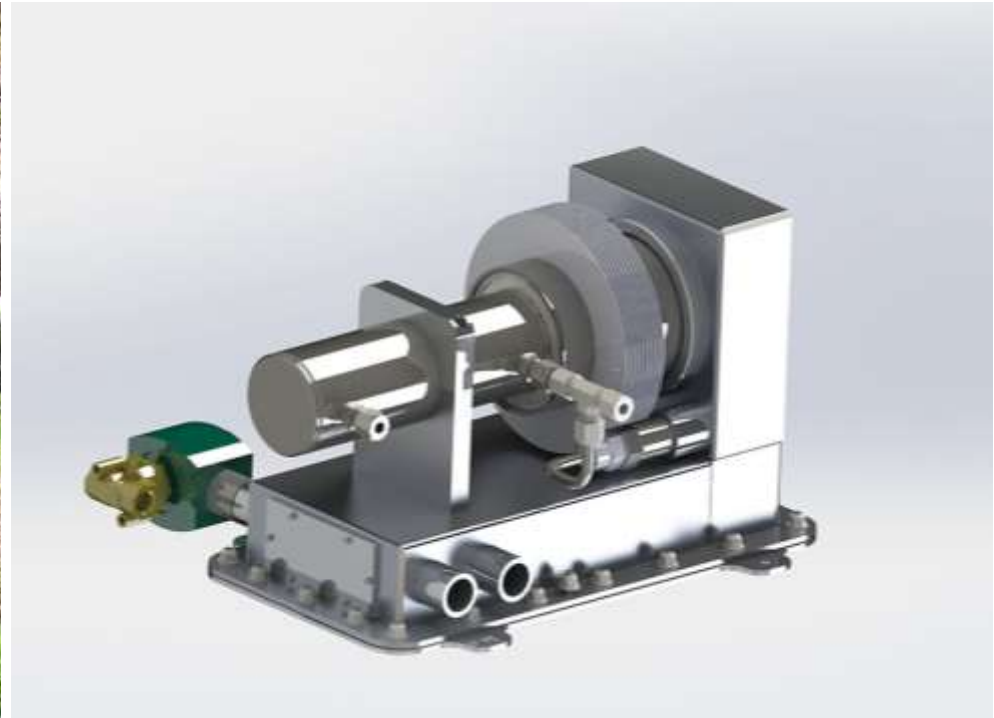
Patents pending

Patents pending

Patents pending

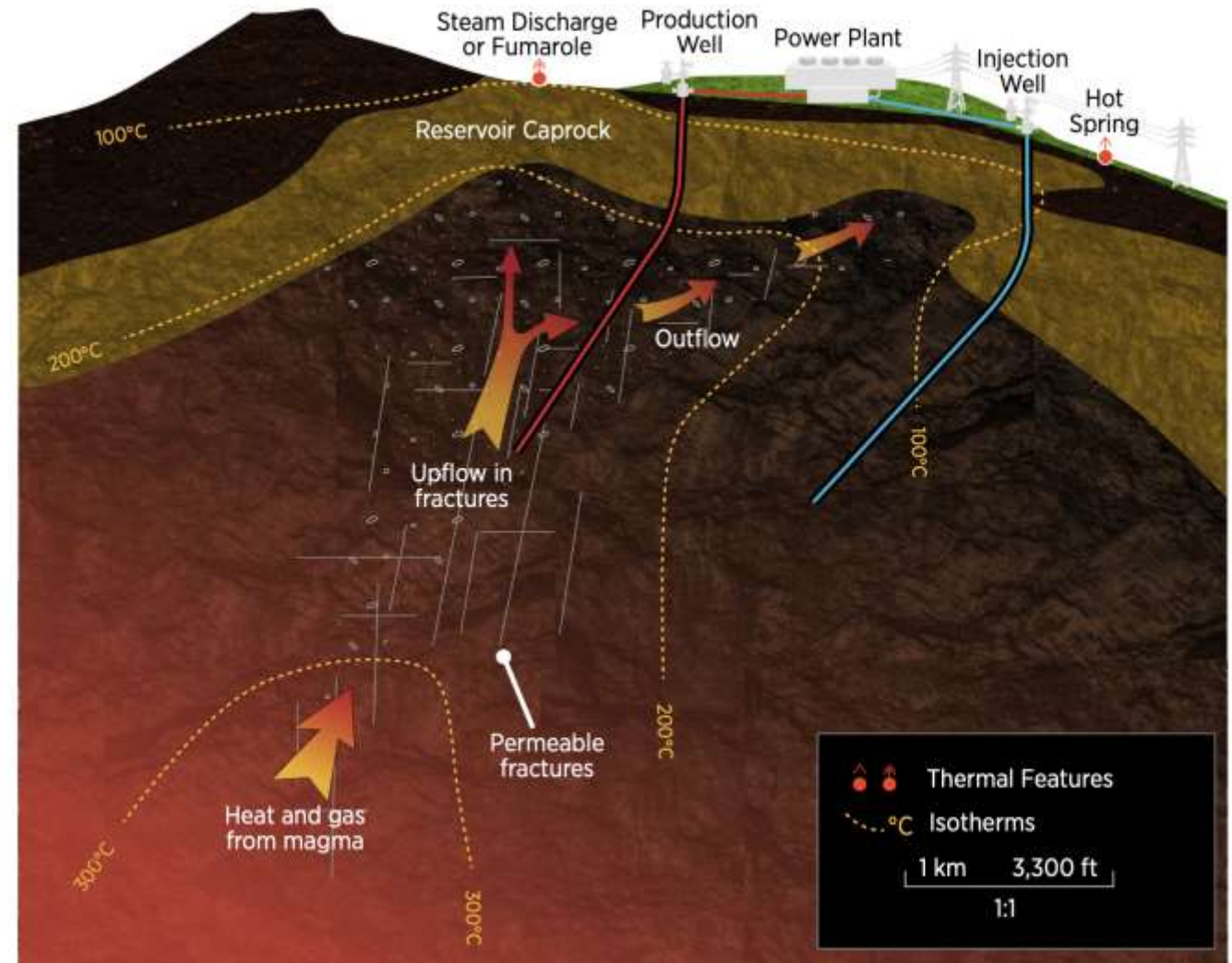
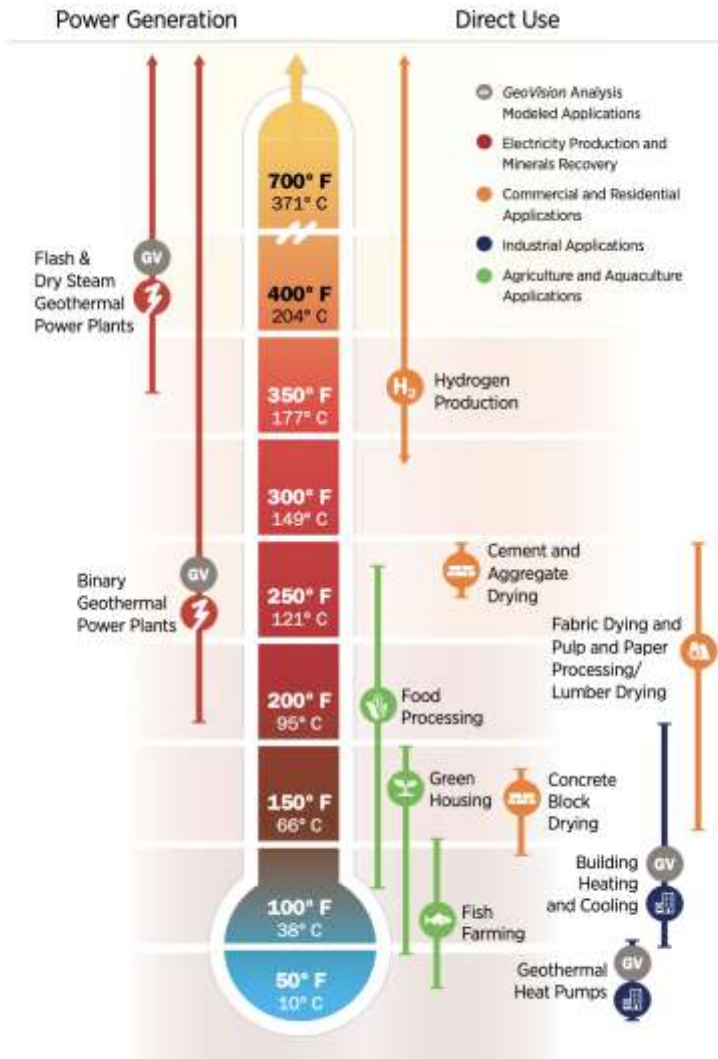
Patents pending

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



ENERGY TRANSITION THROUGH TECHNOLOGY SYNTHESIS

Systems Engineering for Enhanced Geothermal Systems, Supercritical CO₂ and SAGD



750 °F EGS Packer



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封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～

大府特産物株式会社（以下「大府」）、「東京経済」誌の特長記事に採択された日本財団-DeepStar[®]連携技術開発助成プログラム（以下「連携技術開発助成プログラム」）に採択された「²²Supercritical Enhanced System」型地熱発電システムで地熱発電の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封技術を開発する一環として、産学連携事業の共同開発である日本財団-DeepStarにより採択された。同日、両者はより深いプログラムを締結しました。

経緯

スーパーコンピュータを用いた解析や可成り大規模な人工的な地熱貯留層、高圧高温度域での材料開発など、産学連携、産官学連携、産官学連携による電力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、深部地層に熱水を貯留させることで、地熱を抽出して発電しています。従来の地熱発電は、地熱を抽出して発電しています。

このように産学連携による技術開発が推進されています。特に、地熱発電の熱安定性に優れた耐食合金を開発すること、これにより地熱発電の熱安定性を確保することができます。また、地熱貯留層内の密封技術を開発することで、地熱貯留層内の熱水を貯留させることができます。地熱貯留層内の密封技術を開発することで、地熱貯留層内の熱水を貯留させることができます。

一方で、本産品の開発には、産学連携による共同開発が不可欠です。特に、地熱発電の熱安定性に優れた耐食合金の開発には、産学連携による共同開発が不可欠です。産学連携による共同開発が不可欠です。産学連携による共同開発が不可欠です。

採択された開発テーマの概要

一 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、それらを用いた地熱発電を実現する。

一 内容

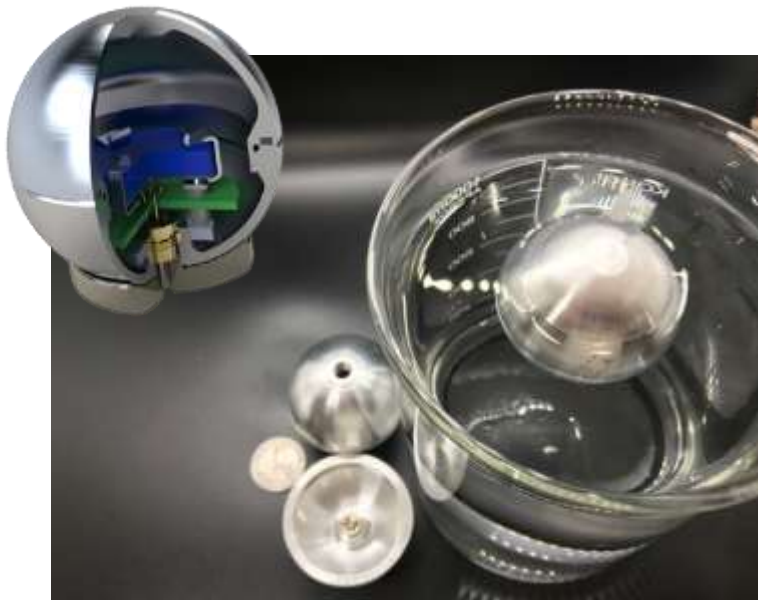
大府特産物株式会社（以下「大府」）と東京経済大学の共同開発事業として、クリーンな電力供給できる超臨界型EGSの地熱発電システムを開発する。超臨界型EGSで使用可能な熱安定性に優れた耐食合金を開発し、それらを用いた地熱発電を実現する。



2022-2024 NIPPON Foundation/DEEPSTAR Awardee

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

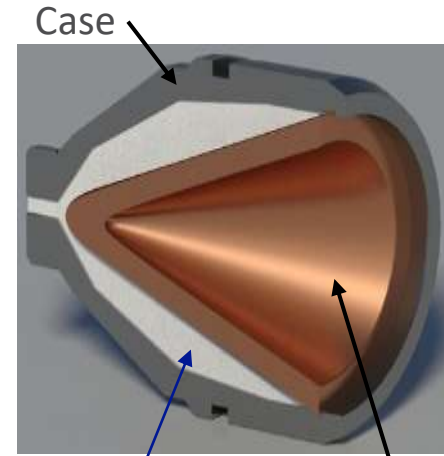
Technology Synthesis & Cross Pollination



From LWS Flowable Sensors to Human Engineering, Prosthesis with AI



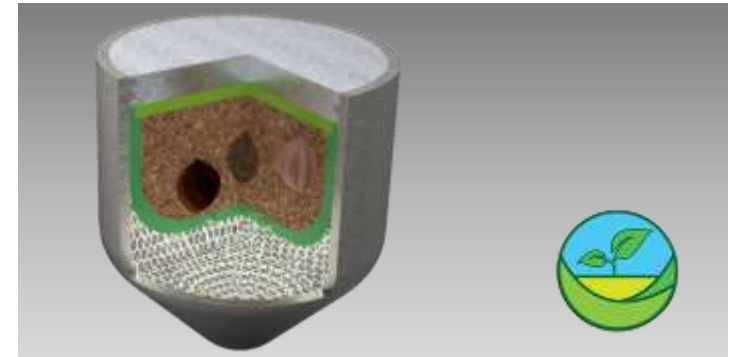
From Bulk Metallic Glass Nozzle Plugs to Human Engineering, Bioabsorbables



High Explosive (RDX, HMX, HNS) Liner



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





OVOPOD

DAMORPHE

Giving Nature Our Helping Hand

Planting Seeds from Aerial Drones



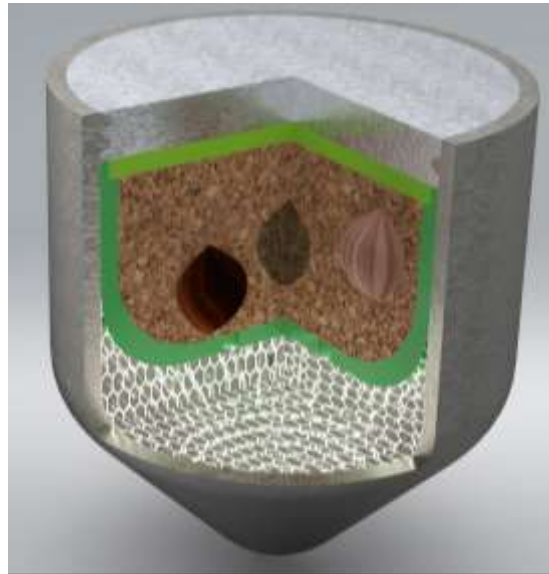
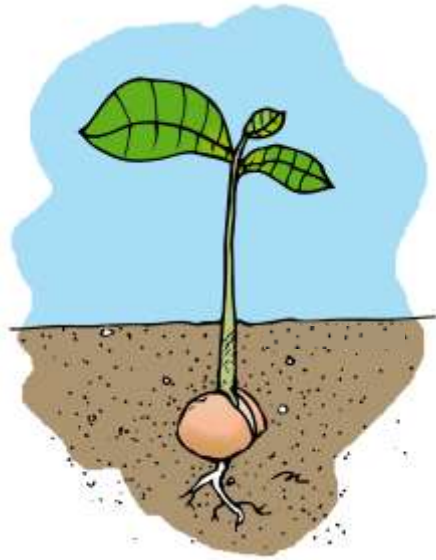
“A Promising Concept for Reforestation and Reclamation of Desert,
Where Accessibility to Machines / Human Planters is Difficult”





Giving Nature a Helping hand

Environmentally friendly, light weight SeedPOD
Dissolvable metallic shell protects seed/nutrient package



Planted in soil !
NOT dropped ON Soil.....

Shock absorber
Water for germination

Pod pneumatically fired from drone into the ground
Planted to a depth of few inches in soil

If you don't sow it
You don't grow it !

ADIPEC 2021 Awardee, only 2 years after starting



جوایز ادیپک
ADIPEC AWARDS
EXCELLENCE IN ENERGY 2021

2021 Categories | 100+

ADNOC

THE ADIPEC AWARDS 2021 FINALISTS

BREAKTHROUGH RESEARCH OF THE YEAR <ul style="list-style-type: none">• ADNOC & MicroSilicon: Real Time Aliphatics Detection Sensor using Quantum RF: A paradigm shift making reactive processes• Saudi Aramco: Saabk EXO-STORR Technology to Enhance Oil Production• Shell Catalyst & Technologies: Shell Dual Hydrogen Process	BREAKTHROUGH TECHNOLOGICAL PROJECT OF THE YEAR <ul style="list-style-type: none">• ADNOC: Non-metallic, Disruptive Materials for Longer Asset Life Cycle• L&T Hydrocarbon Engineering: Implementation of Full Automation in Harba Development Project - The First Eye in GCC• Shell: Robust Well Location Optimization Technology
DIGITAL TRANSFORMATION PROJECT OF THE YEAR <ul style="list-style-type: none">• ADNOC: Tharwa Center - The Digital Transformation Hub of ADNOC Upstream• ADNOC & Datagration: 10x Portfolio Optimization & Opportunities - Maximize Asset Value from existing resources• Saudi Aramco: Futuhah: technology powering world's largest intelligent oil field	SOCIAL CONTRIBUTION AND LOCAL CONTENT PROJECT OF THE YEAR <ul style="list-style-type: none">• OMV Petrom: Tomosa plants for tomowa• OMV Petrom: D'Amir's School• Saudi Aramco: In-Kingdom Total Value Add Program (IKIP)
OIL AND GAS INCLUSION AND DIVERSITY COMPANY OF THE YEAR <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 workforce• Emerson Automation Solutions: Emerson's Diversity & Inclusion Programs and Initiatives	YOUNG TECHNICAL PROFESSIONAL OF THE YEAR <ul style="list-style-type: none">• ADNOC: Fatma Yusuf Al-Suwaidi• Saudi Aramco: Mohammad Al-Jubran• Saudi Aramco: Hashayer Abdalmonem
INNOVATION IN DECARBONISATION COMPANY OF THE YEAR <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 real-life future from fossil fuels to renewables	OIL AND GAS START-UP COMPANY OF THE YEAR <ul style="list-style-type: none">• DAMORPHE INC: DAMORPHE, an innovative technology start-up• Data Gumbo: Data Gumbo to Lead Smarter, Faster, Learner 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 and Canada, with expansion to other regions, such as the Middle East and Latin America
- DAMORPHE is an example of nationally diverse, and geographical spread team with members from Tunisia, China, India, UK, USA, France and Brazil

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a Sustainable Energy Future**