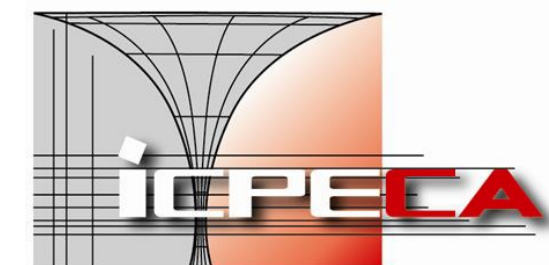


ORKADUCT - Well Technology for European Low Temperature Geothermal Fields

EEA and Norway grants project 2024/393366



Dr. Jan Prikryl
Researcher/Project Manager

Gerosion

27.03.2025

How it all started

Iceland & Romania partnership



www.eeagrants.org



Prof. Ioana Csaki
University Politehnica Bucharest (UPB)



<https://www.geo-coat.eu/>



<https://www.geohexproject.eu/>



Prof. Sigrún Nanna Karlsdóttir
University of Iceland

Iceland
Liechtenstein
Norway grants

Norway grants

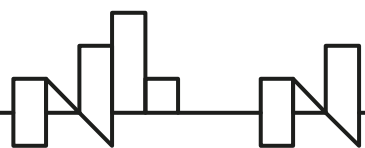
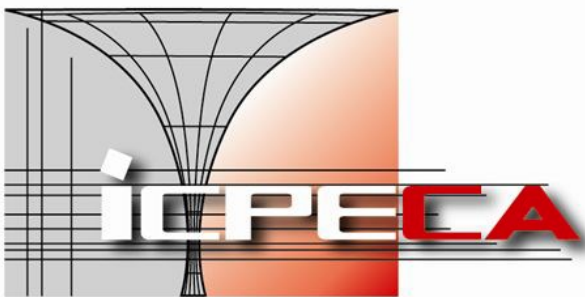
Open Call for Bilateral Cooperation in the Green Transition



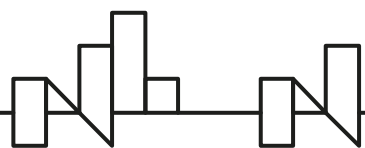
ORKADUCT

Well Technology for European Low Temperature Geothermal Fields

gerosion



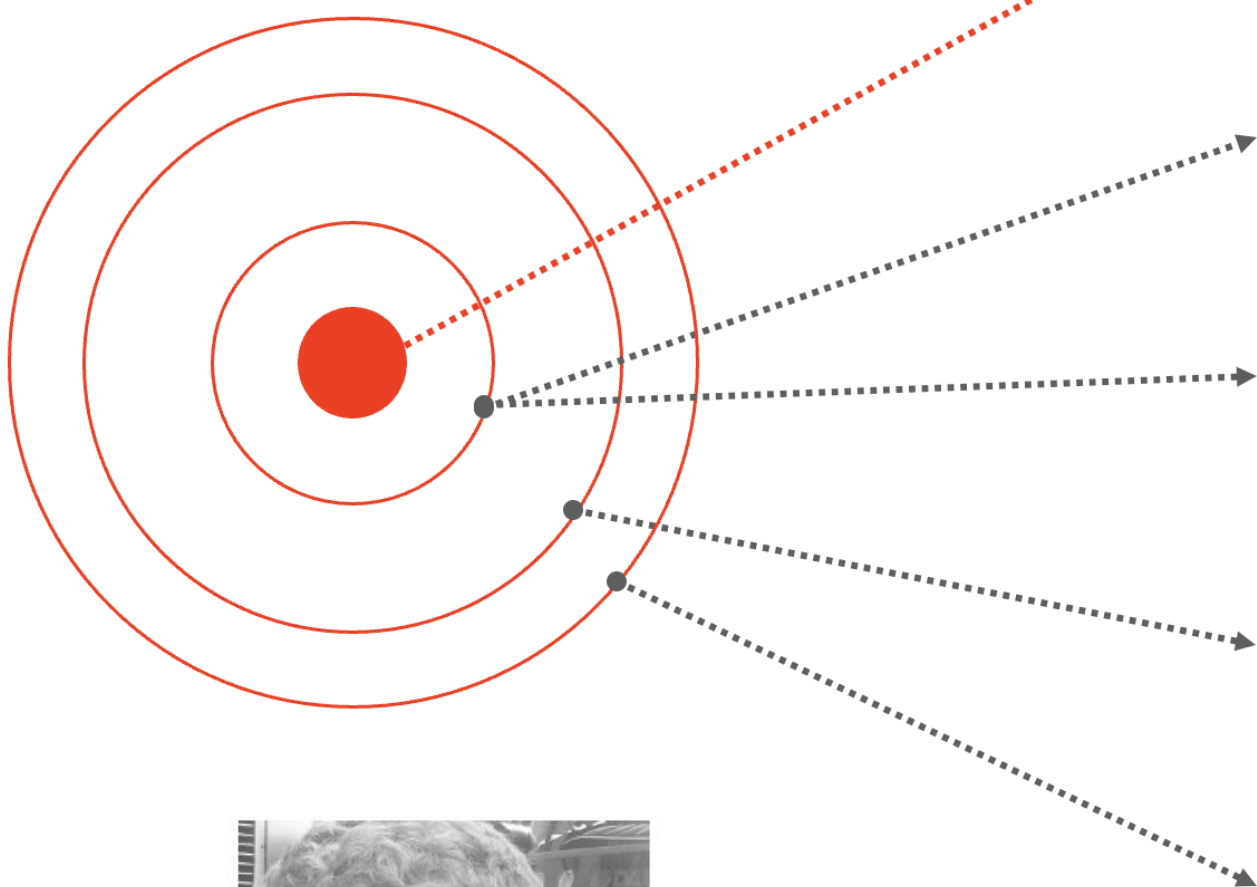
Collaboration – Romania & Iceland partnership



Gerosion (IS)

Iceland & Romania partnership

- Icelandic SME founded in 2014 by Sunna Ó. Wallevik & Dr. Sigrún N. Karlsdóttir (**Geothermal corrosion**)



- Geothermal power companies
- Steel and alloys producers
- Aluminium, Si, FeSi and Stonewool producers
- Cement and admixture producers
- Oil and gas power companies



Sunna Ó. Wallevik, CEO
MBA, M.Sc. in Inorganic Chemistry



Prof. Sigrún Nanna Karlsdóttir, CBO
Ph.D. in Materials Science and Engineering



Dr. Kristján Friðrik Alexandersson
Head of R&D
Ph.D. in Physical Chemistry



Dr. Konráð Þór Þorsteinsson
Ph.D. in Material Science & Engineering



Dr. Jan Přikryl
Ph.D. in Geochemistry



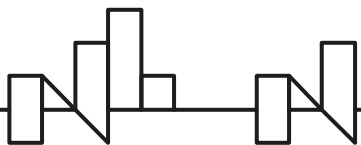
Sverrir Ásbjörnsson
M.Sc. in Mechanical Engineering



Dr. Gifty Oppong Boakye
Ph.D. in Mechanical Engineering



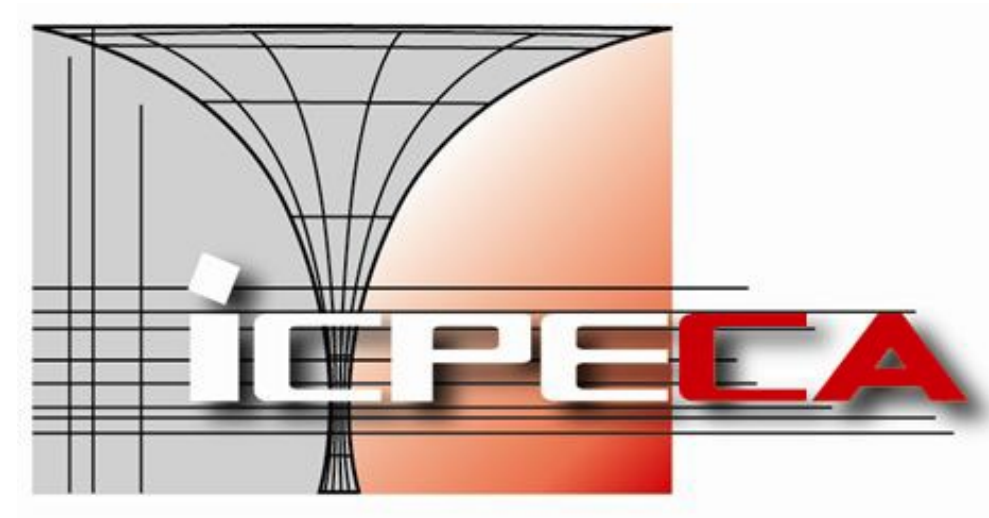
Eyþór Smári Snorrason
B.Sc. in Civil Engineering



INCDIE ICPE-CA (RO)

Iceland & Romania partnership

- ICPE-CA is a research institution specialized in electrical engineering, energy, and advanced technological solutions.



Laura E. Geambazu
Junior Researcher
laura.geambazu@icpe-ca.com



Ciprian A. Manea
Junior Researcher
ciprian.manea@icpe-ca.ro



Delia Pătroi
Senior Researcher
delia.patroi@icpe-ca.ro



Dorinel Tălpeanu
Senior Researcher
dorinel.talpeanu@icpe-ca.ro



Gabriela B. Sbârcea
Senior Researcher
gabriela.sbarcea@icpe-ca.ro



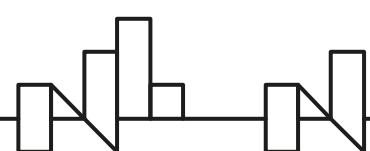
Eugen Manta
Senior Researcher
eugen.manta@icpe-ca.ro

Advanced materials for energy and environment Department (i.e. magnetic materials, metallic materials, polymeric materials, radiochemistry, materials for environmental protection)

Advanced materials for special applications in electrical engineering Department (i.e. carbon materials, ceramic materials, electrochemistry)

Renewable energy sources Department (i.e. wind power, hydraulic energy, solar energy, energy harvesting)

Electromechanical and electromagnetic systems and technologies Department (i.e. drive systems for electric mobility, vibration and acoustic devices, development for test stands for electromechanical and electromagnetic systems, superconductivity, electromagnetic compatibility)



Orkaduct

Bilateral Cooperation in the Green Transition between Gerosion and ICPE-CA

- Increase energy production from renewable sources
- Energy independence of Europe / decrease fossil fuels imports + utilisation of critical raw minerals
- Geopolitical landscape
- Innovation in geothermal wells technology, casing pipe is coated with protective coating to handle aggressive environment, cost saving solutions
- High geothermal potential in Romania

Project Description

Financing Program: EEA and Norway Grants project

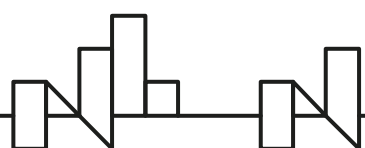
Project Title: "ORKADUCT - Well Technology for European Low Temperature Geothermal Fields" 2024/393366

Grant Total: EUR 134 148

Implementation Period: 16/08/2024 - 31/01/2025

Partners: Gerosion (IS) - Promoter, National Institute for R&D in Electrical Engineering Bucharest (RO) - Partner

Project Objectives: Novel solutions for existing geothermal markets, by unlocking new areas where technology has been the only restriction. Building on decades of geothermal energy in Iceland, Gerosion brings extensive expertise and a geothermal well protection product, ProCase, that can be fully adapted to low temperature geothermal fields in Romania.

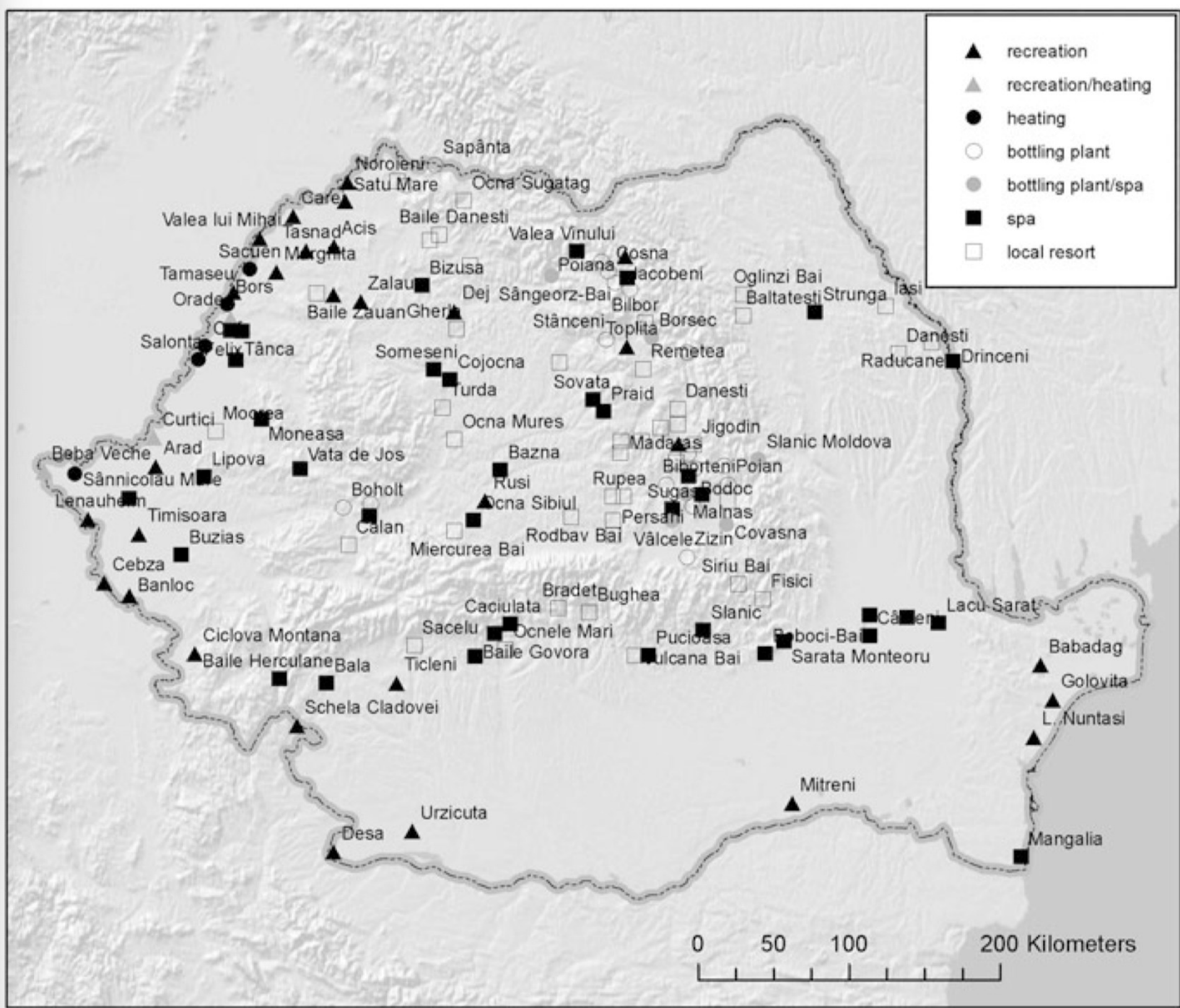


Utilisation of geothermal Romanian water

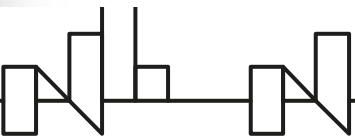
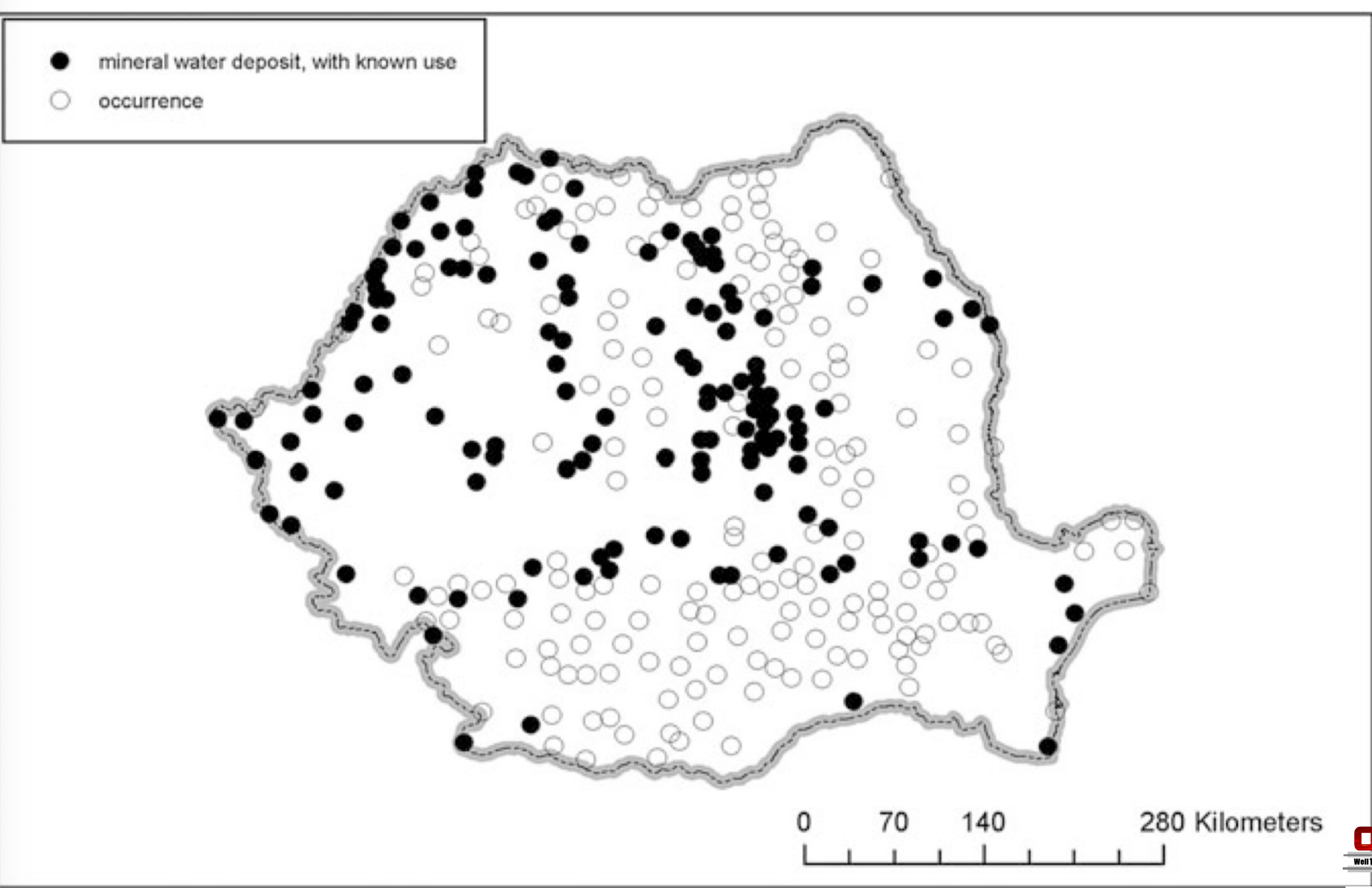
Most of geothermal water is used for spa and recreation

- Low to medium enthalpy geothermal systems, Corrosive species such as H_2S , CO_2 and Cl present corrosion risk in Romania

Main use of mineral waters in Romania



Location of mineral waters in Romania

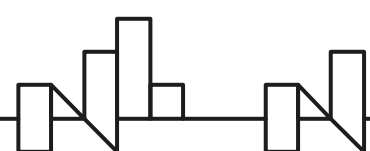


Rosca et al. (2015)

Material challenges in geothermal industry

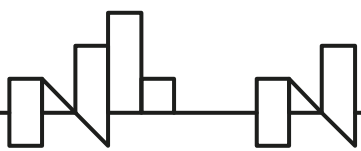
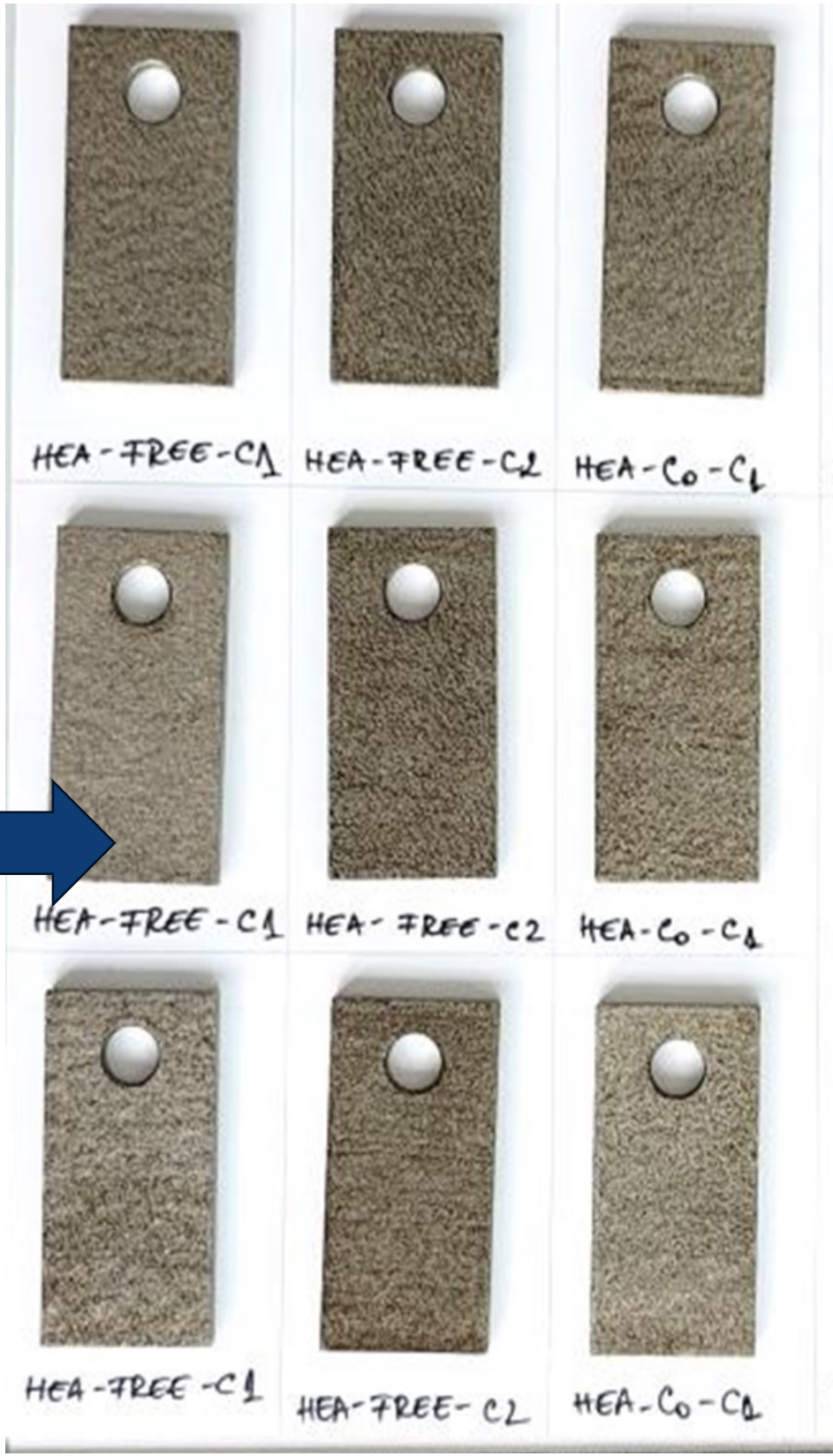
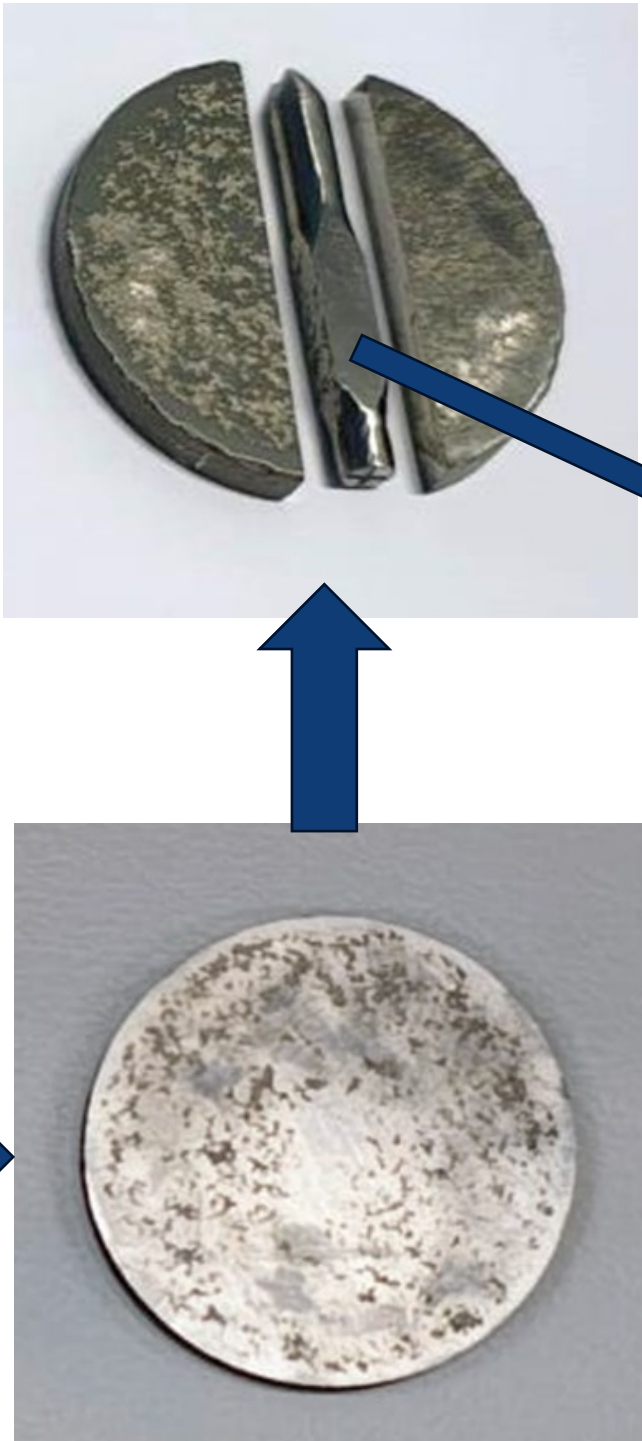
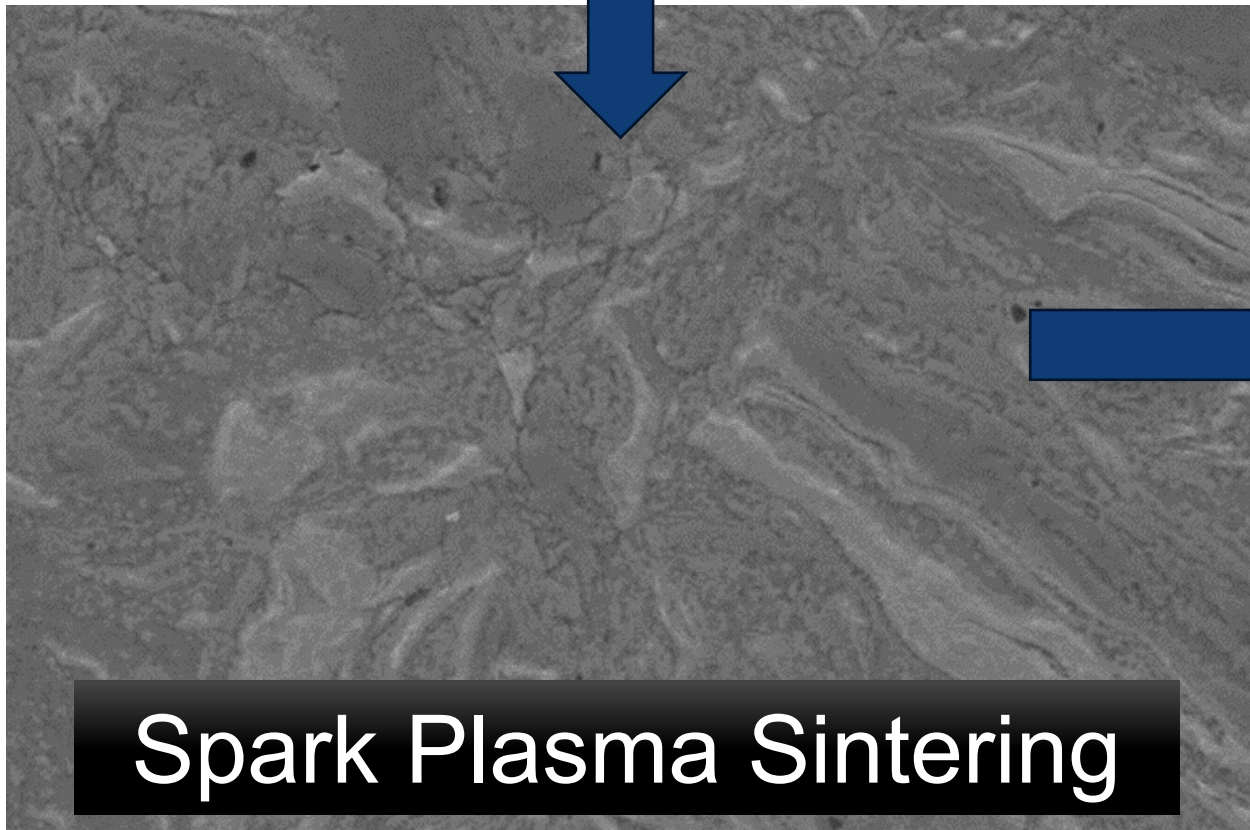
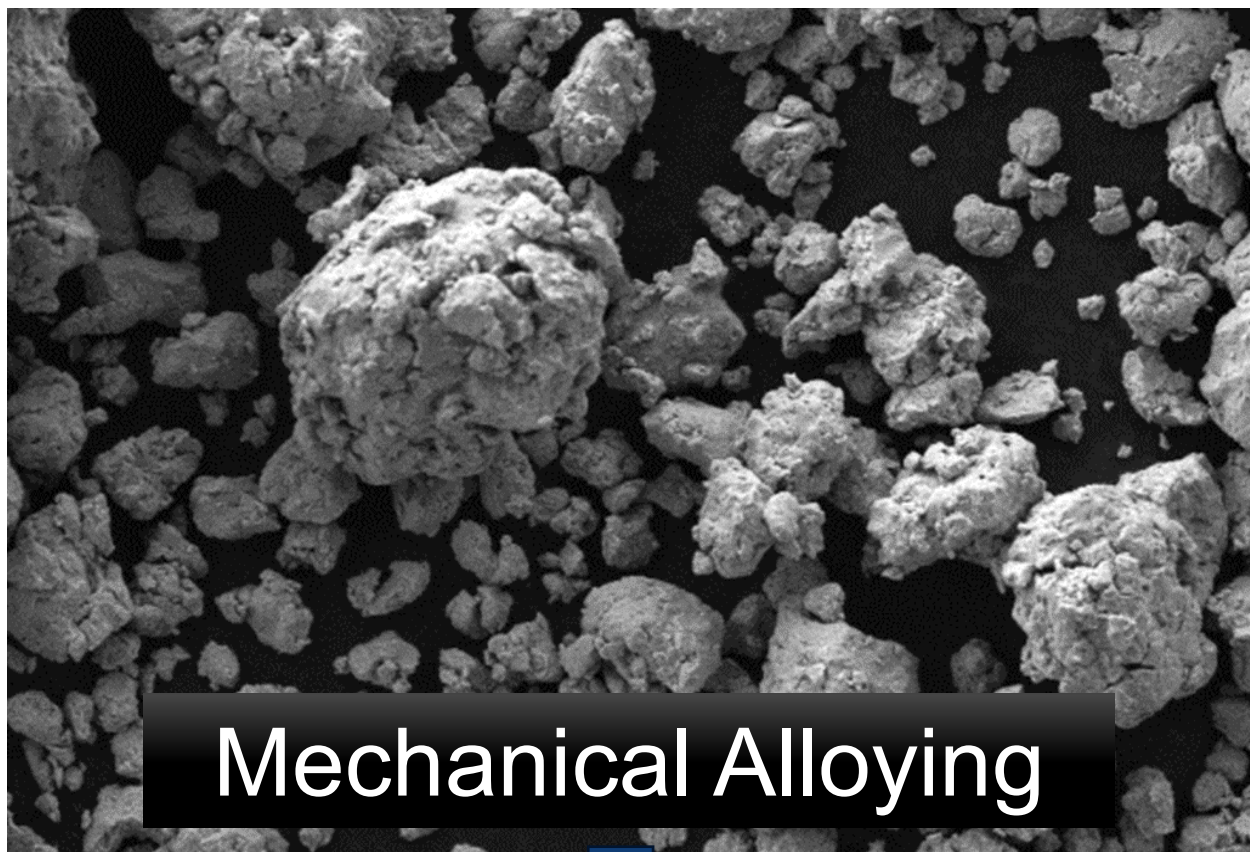
Corrosion issues

- Casing failures mechanisms
- High T & P, corrosive environment (H_2S , CO_2 , HCl)
- Corrosion problems in casing and liner material
- Casing failures due to high temperatures and thermal cycling
- Poor cementing promoting casing collapses
- Erosion-Corrosion due to high flow rates



Orkaduct, protective coating solution

Activity 1: – Coating Development - ICPE-CA (RO)



Simulation of Romanian geothermal waters

Activity 2: Material testing of protective coating, Gerosion



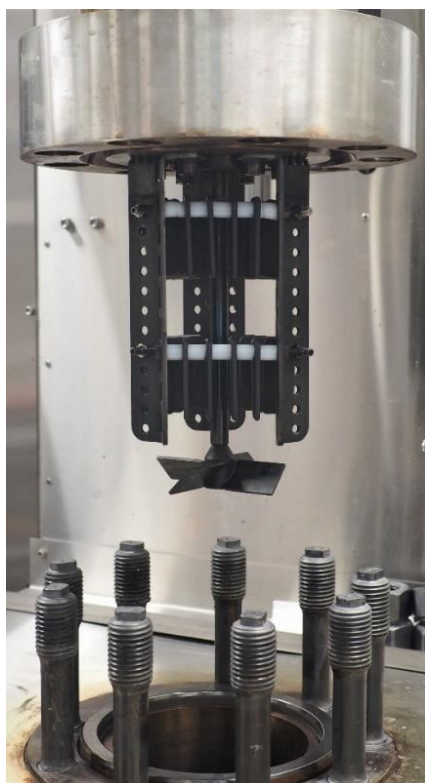
The HPHT corrosion lab



The autoclave with the lid opened before installation of test samples in the sample holder



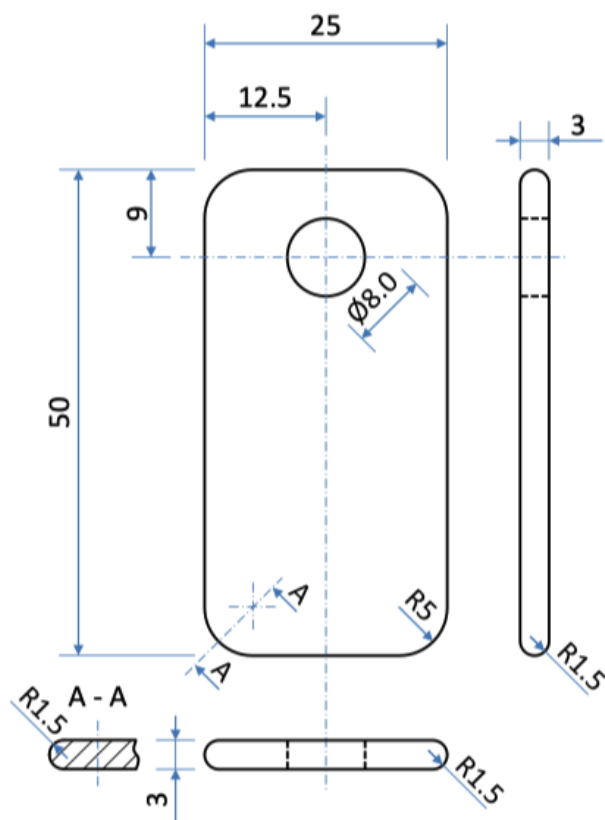
The autoclave (middle), gas filling station (right) and H₂S capture system (left)



Coupon samples installed in the autoclave



Drawing of coupon samples for the corrosion tests



Before test



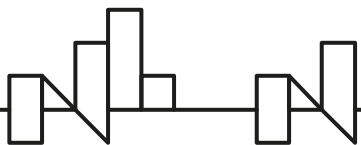
After test



Left-thin HEA I and right-thick HEA II), each of (a) CrFeNiMo, (b) Co_{0.5}CrFeNiMo, and (c) Al_{0.5}CrFeNiMo



Back view carbon steel substrates; (a) CrFeNiMo, (b) Co_{0.5}CrFeNiMo, and (c) Al_{0.5}CrFeNiMo



Activity 3: 1st International Workshop on “GeoFrontiers: Advances in Geothermal Technologies” at ICPE-CA

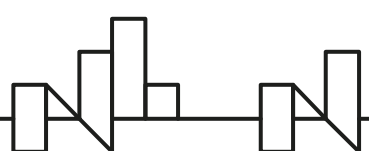


Orkaduct

Bilateral Cooperation in the Green Transition between Gerosion and ICPE-CA

- Increase energy production from renewable sources
- Energy independence of Europe / decrease fossil fuels imports + utilisation of critical raw minerals
- Geopolitical landscape
- Innovation in geothermal wells technology, casing pipe is coated with protective coating to handle aggressive environment, cost saving solutions
- High geothermal potential in Romania

Thanks to Iceland, Liechtenstein, Norway grants for supporting European business!



Always open for cooperation

- Seeking strategic partners to enhance our research efforts
- Interested in collaborations that bring diverse techniques or methodologies (LMD, HVOF deposition techniques, TEM analysis)
- Looking for businesses that could benefit from or apply our research findings (coatings for aggressive media)
- Open to partnerships that offer complementary expertise or resource (relevant testing conditions, corrosion & wear)
- Exploring synergies with organizations that align with our research goals

