Ref. Ares(2025)3526102 - 30/04/2025

DELIVERABLE D3.3

Thermodynamic modelling of phase equilibria

Lead Beneficiary: UNIPD

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Date: 31/10/2024 (deadline)

Dissemination Level

PU	Public, fully open	
SEN	Sensitive - limited under the conditions of the Grant Agreement	**X**
CI	EU classified - RESTREINT-UE/EU-RESTRICTED, CONFIDENTIEL-UE/EU-CONFIDENTIAL, SECRET-UE/EU-SECRET under Decision 2015/444	

This research is funded by the European Union (G.A. 101046937). The views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or EISMEA. Neither the European Union nor the granting authority can be held responsible for them.

Document History

Version	Date	Authors	Description
1	25/03/2025	Pawel Slupski (UNIPD)	First draft
2	03/04/2025	Antonio Galgaro UNIPD)	Reviewed and submitted to reviewer
3	29/04/2025	Adele Manzella and Giordano Montegrosso (CNR)	Reviewed by reviewer
5	30/04/2025	Luc Pockelé (RED)	Final review for submission

Disclaimer

This publication was completed with the support of the European Innovation Council and SMEs Executive Agency (EISMEA) under the HORIZON-EIC-2021-PATHFINDEROPEN-01 programme. This research is funded by the European Union (G.A. 101046937). However, the views and opinions expressed are those of the author(s) only and do not necessarily reflect those of the European Union or EISMEA. Neither the European Union nor the granting authority can be held responsible for them.

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ABBREVIATIONS AND GLOSSARY OF ACRONYMS

Acronym	Extended definition
BSE	Backscattered electron
DG	Department of Geosciences
DLT	Discrete Laser Tests
EDS	Energy Dispersive Spectroscopy
FEG	Field emission gun
IR	Infrared
LLT	Linear Laser Tests
OM	Optical microscopy
PPL	Plane polarized light
ROP	Rate of Penetration
SE	Secondary electron
SEM	Scanning Electron Microscopy
SR	Red sandstone
SY	Yellow sandstone
TCS	Thermal Conductivity Scanner
UNIPD	University of Padua
WD	Working distance
XPL	Crossed polarized light
XRD	X-Ray Diffraction
XRF	X-Ray Fluorescence
Symbol	Definition
P	power (kW)
ρ	density (g/cm^3)
P_ρ	power density (W/cm^3)
E	Young's Modulus (GPa)
Ab	water absorbance (%)
V_p	P-wave velocity (km/s)
V_s	S-wave velocity (km/s)
v	Poisson's ratio (-)
G	shear modulus (GPa)
λ	thermal conductivity (W/m·K)
C_p	volumetric thermal capacity (J/m^3·K)
α	thermal diffusivity (m^2/s)
S_E	specific energy (kJ/cm^3)
t_i	time of irradiation (s)
T	temperature (°C)
T_s	average temperature of spallation (°C)

EXECUTIVE SUMMARY

This report focuses on the phase transition of the rock (solid-liquid-solid). Melting, quenching and formation of glass were investigated, and its mineral and chemical composition were characterised. During the laser experiments glass was obtained in situ (on borehole walls) and from the accumulation of thermally spalled particles that partially melted and coalesced. With the use of the data shown in deliverables D3.1 and D3.2 thermodynamic modelling was performed to estimate melting and quenching temperature at various conditions.

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