



Formulation and Performance Test of Green Cement from Tanzanian Silicate Materials for Sustainable Enhancement of Oil and Gas Wellbore Integrity

Nuru L. Patrick, Makungu M. Madirisha*, Regina P. Mtei

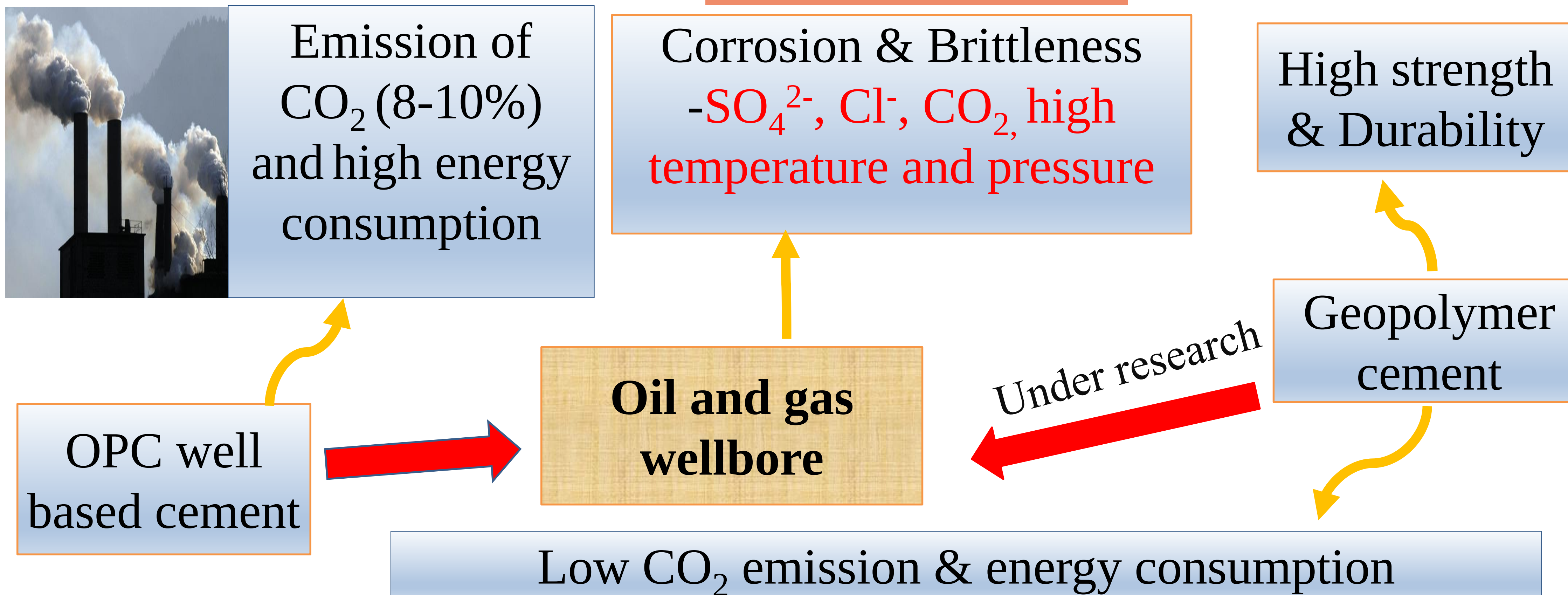
Chemistry Department, College of Natural and Applied Sciences, University of Dar es Salaam,

P.O Box 35061, Dar es Salaam, Tanzania

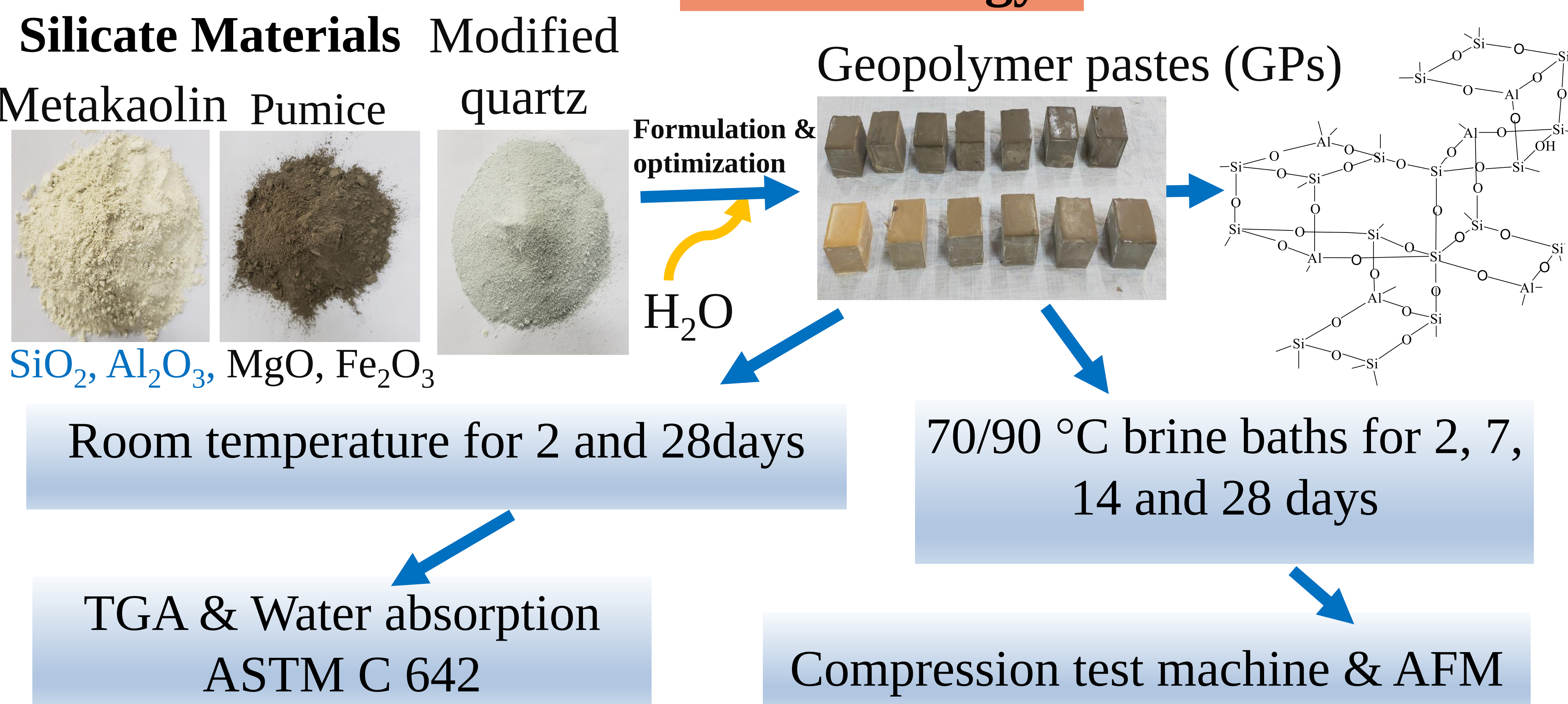
*Corresponding author; email: makungumarco@udsm.ac.tz



Introduction



Methodology



Results

Compressive strength

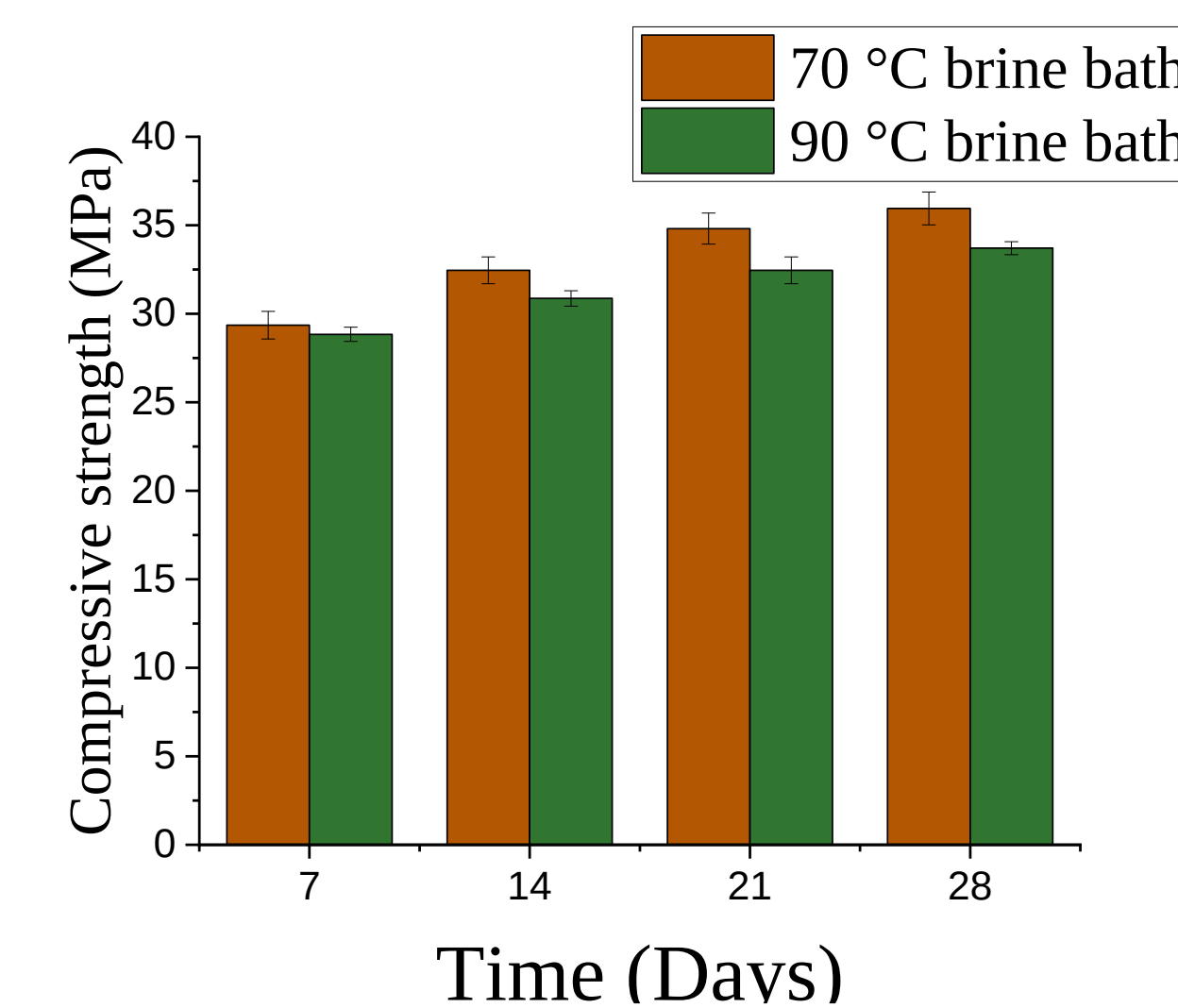


Fig 1: Compressive strength Vs curing time

Thermal stability

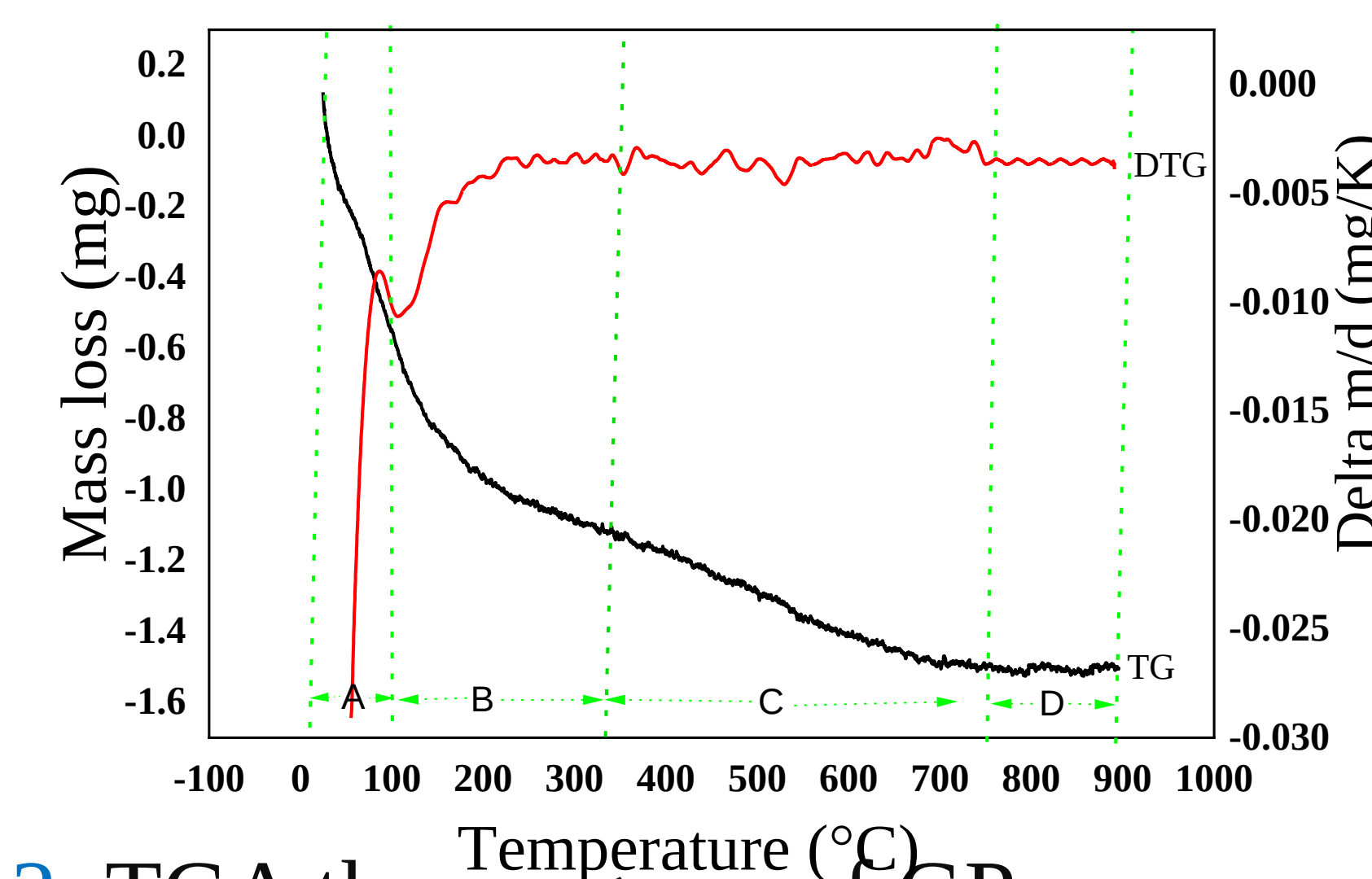


Fig 2: TGA thermogram of GP

Surface topography

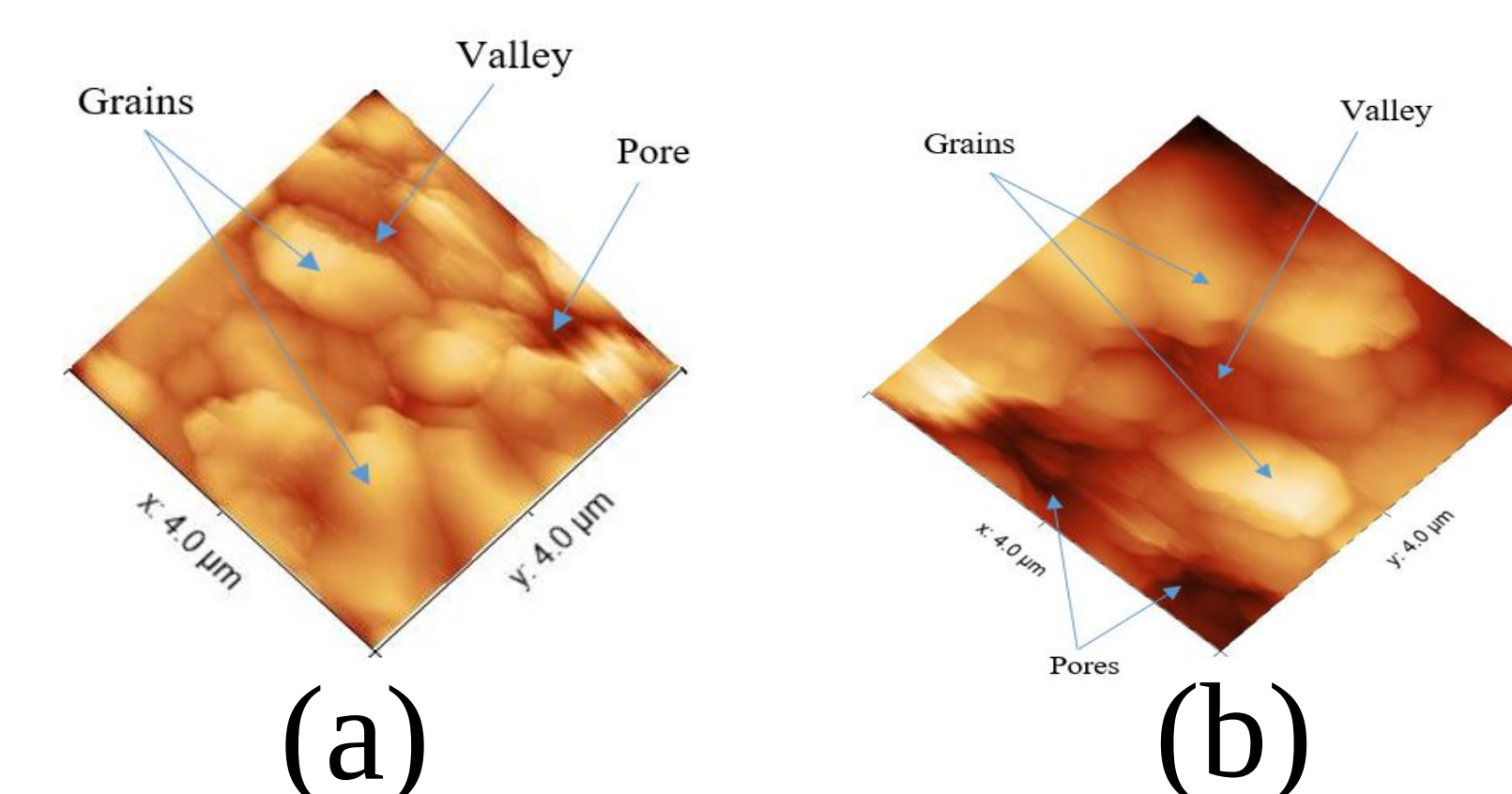


Fig 3: AFM image of GP (a) cured in 70 °C brine baths (b) 90 °C brine baths

Discussion

❑ Tanzanian silicate-based GPs achieved good compressive strength of 35.94 and 33.71 MPa after 28 days in 70 and 90 °C brine baths, respectively. (Figure 1). Moreover, GPs were thermally stable up to 900 °C (Figure 2) and had few pores and no cracks (Figure 3).

Conclusion

❑ Tanzanian silicate-based geopolymer cement meet minimum requirement for oil and gas wellbore constructions. Moreover, is a potentially sustainable eco-friendly aligning with Sustainable Development Goals 9, 11 and 13.

Recommendations

- ❑ We recommend the following to be done:
 - Determination of shear bond strength of Tanzanian silicate-based geopolymer cement.
 - Studying the possibility of using other locally available materials that are rich in SiO₂ and Al₂O₃ to formulate geopolymer cement.
 - Collaboration, stakeholders, and regulatory bodies in realizing the potential of geopolymer.