



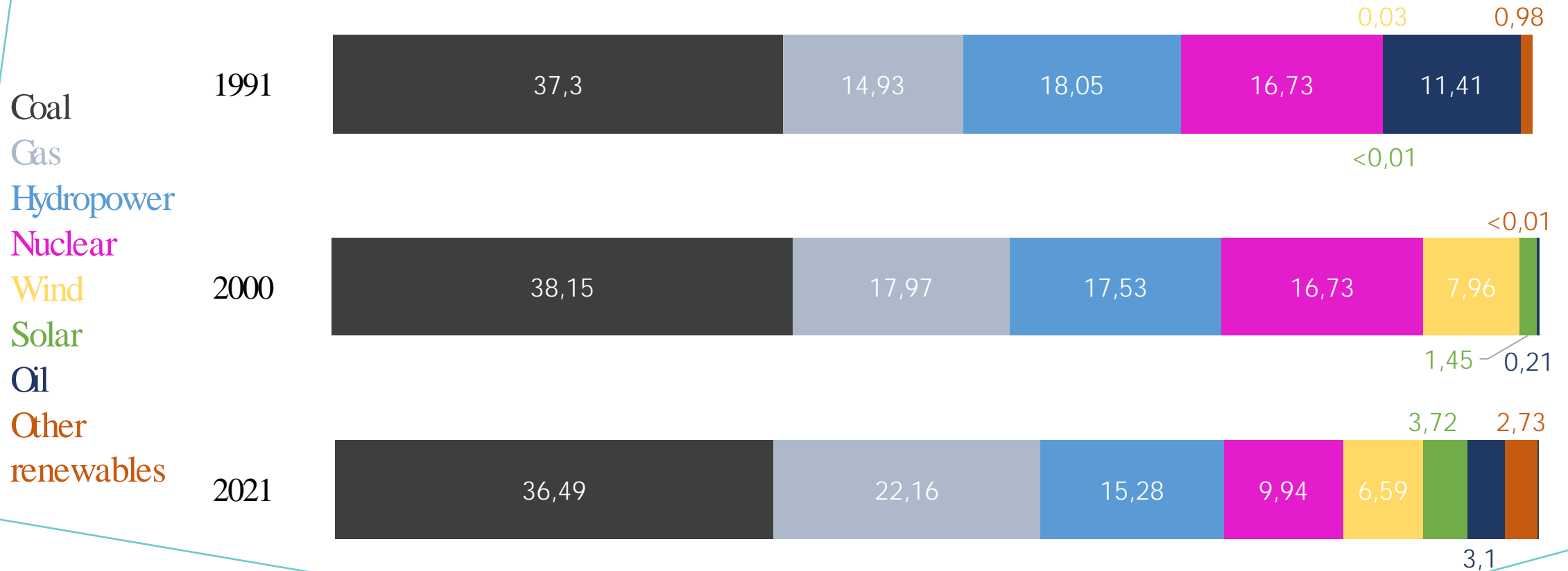
TOWARDS ZERO CARBON EMISSION – NEW TRENDS IN
COAL APPLICATION AND ORGANIC WASTE MANAGEMENT

13 MAY 2022

GEOPOLYMERS FROM FLY ASH – SECONDARY RESOURCE UTILISATION

PRESENTED BY MÁRIA AMBRUS

SHARE OF ELECTRICITY PRODUCTION BY SOURCE WORLDWIDE



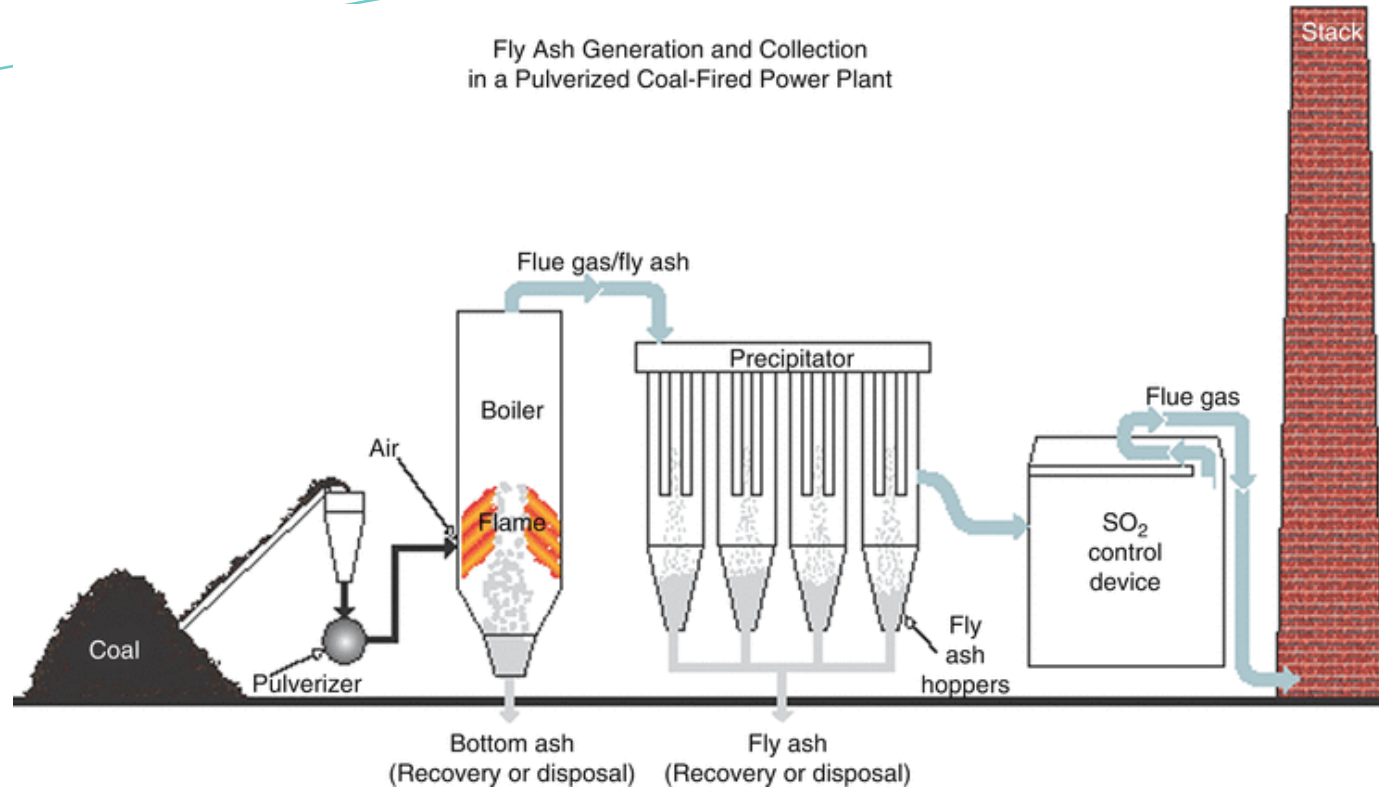


Figure 1. Fly ash generation in a pulverized-coal-fired power plant (Chou, 2012)

FLY ASH PRODUCTION

GLOBAL COAL FLY ASH PRODUCTION

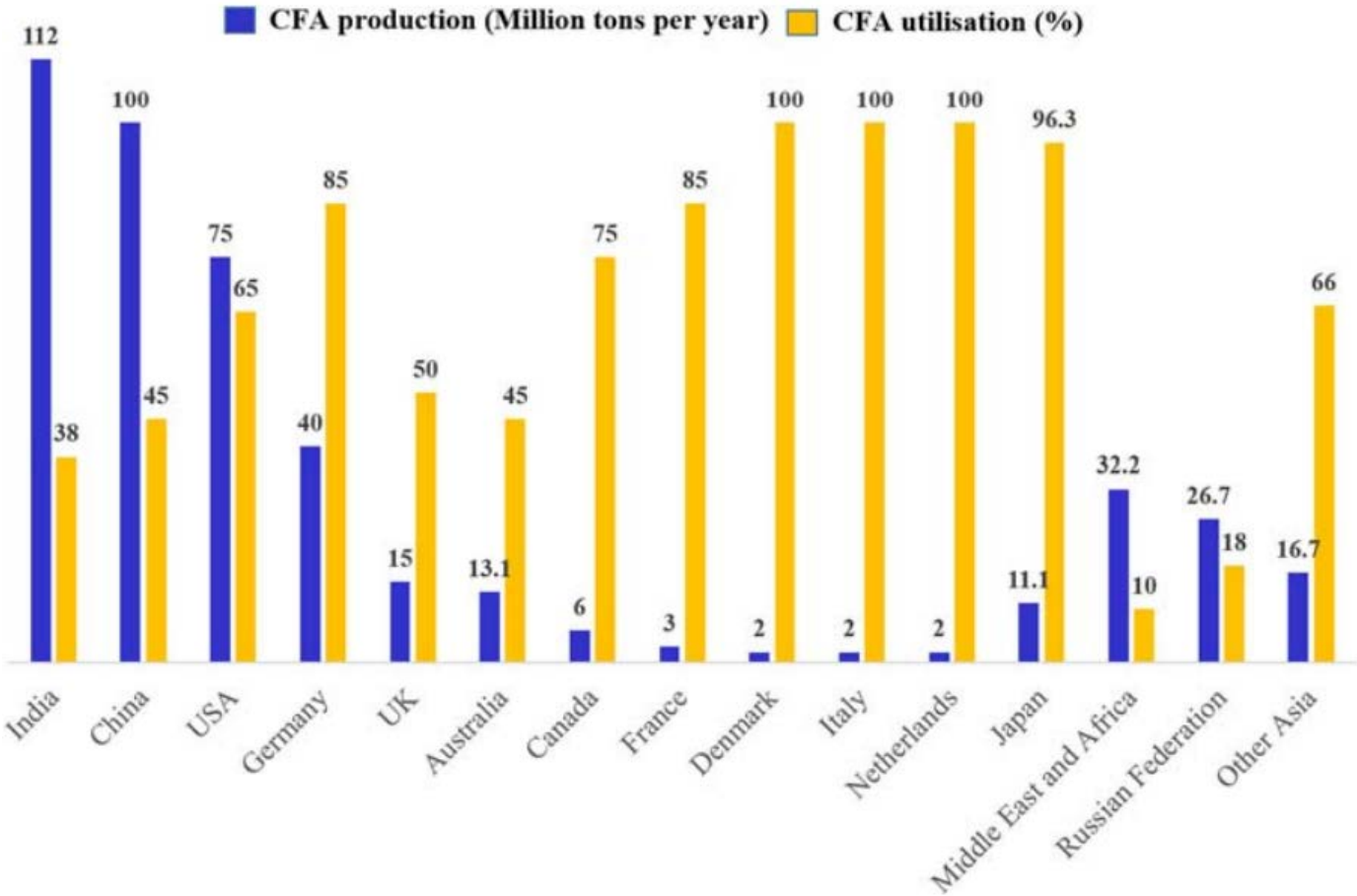


Figure 2. Production of coal fly ash in the world (Gollakota et a., 2019)

FLY ASH UTILISATION

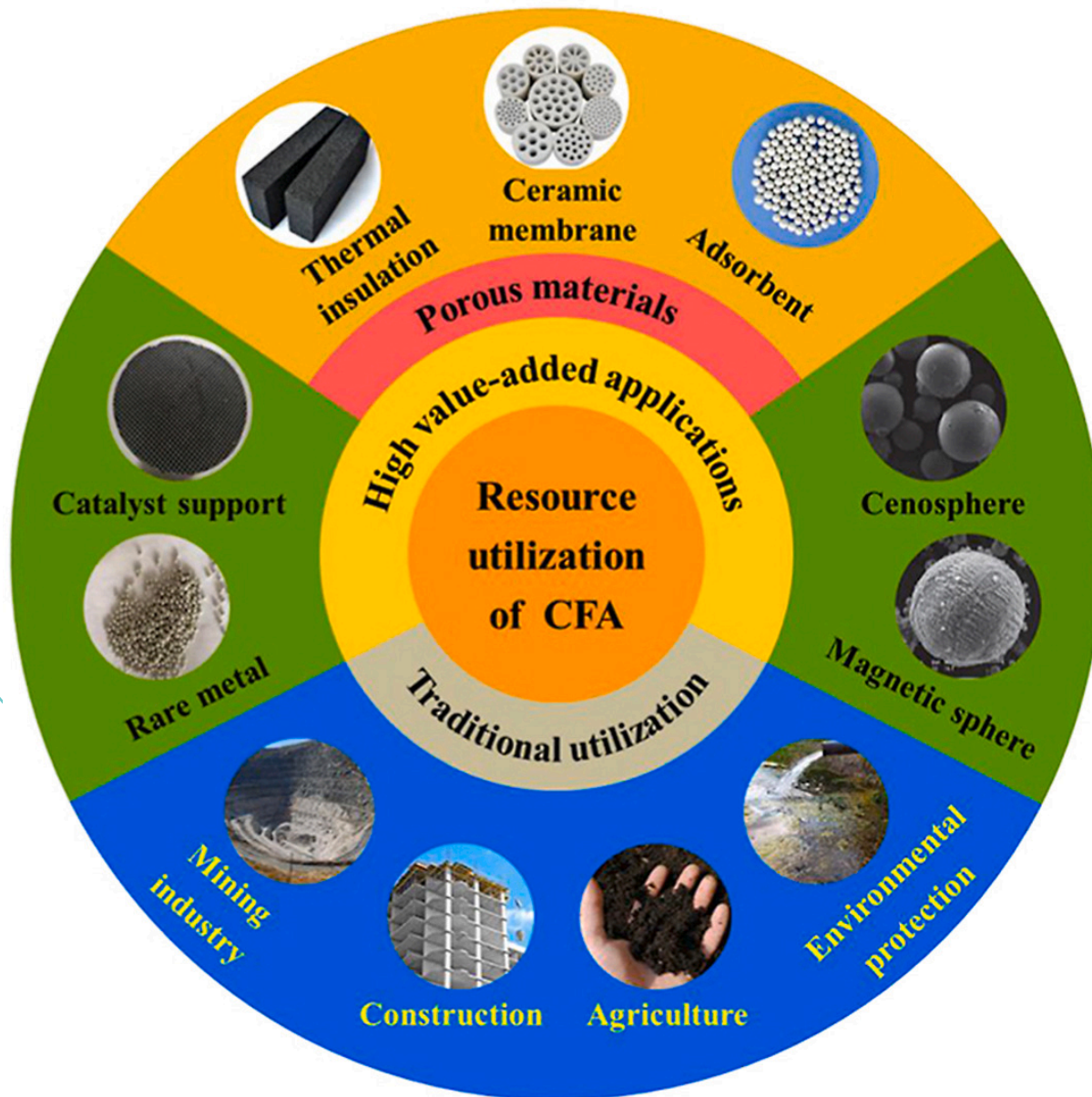


Figure 3. Application possibilities for fly ash (Wang et al., 2021)

GEOPOLYMERS

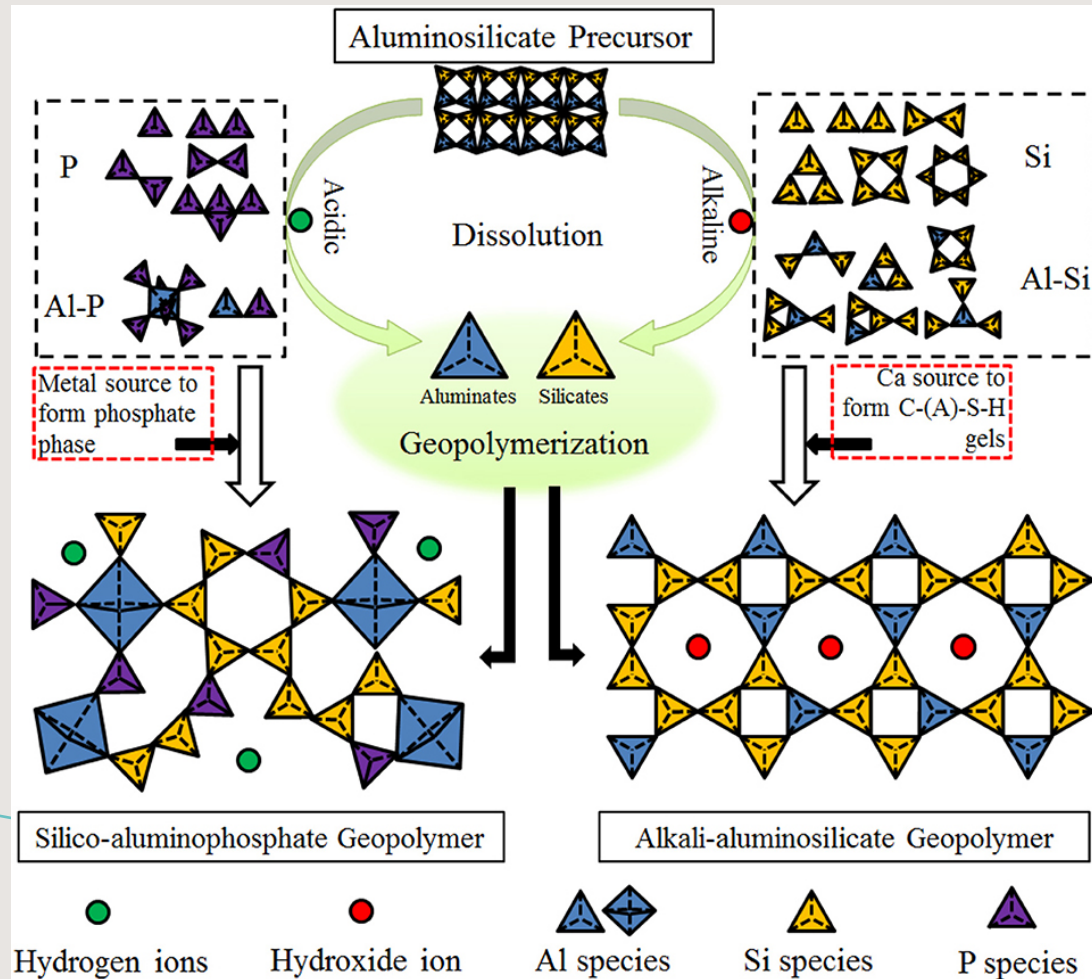


Figure 4. Alkali and acidic activation for geopolymers (Wang et al., 2019)

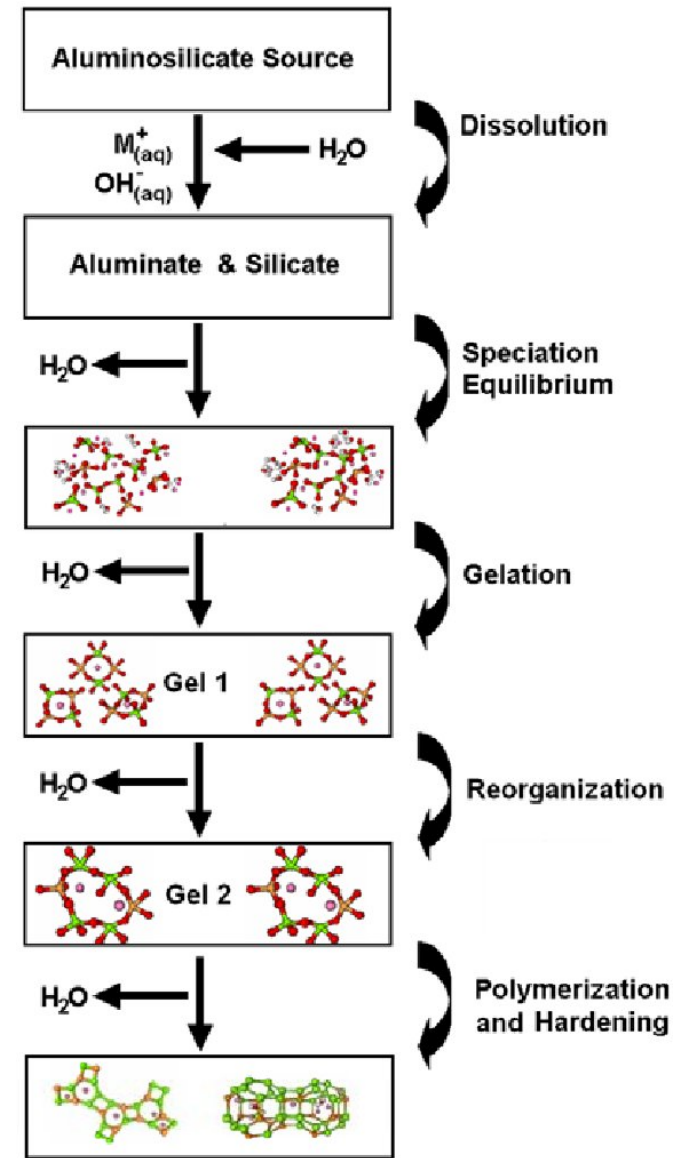
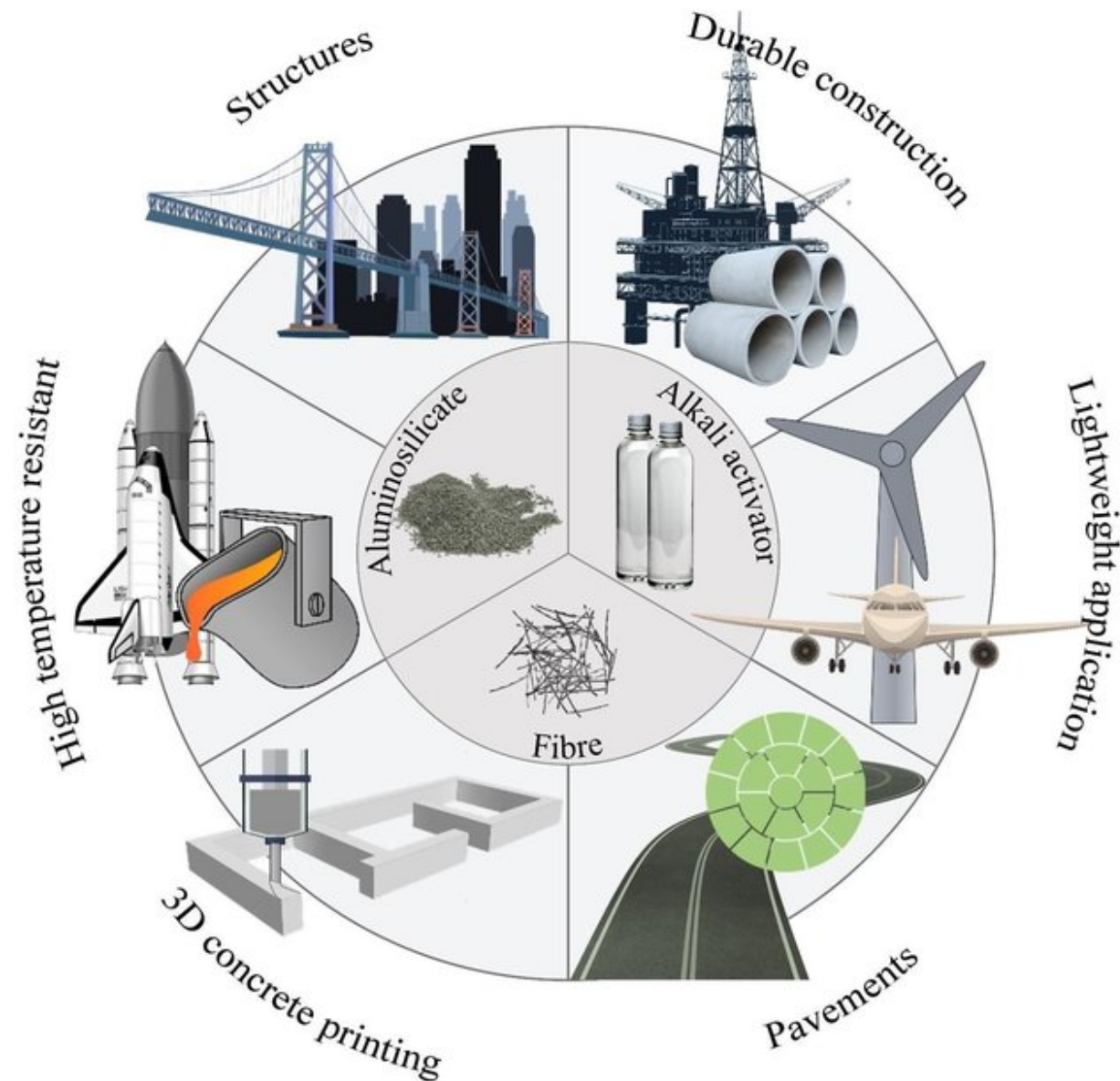


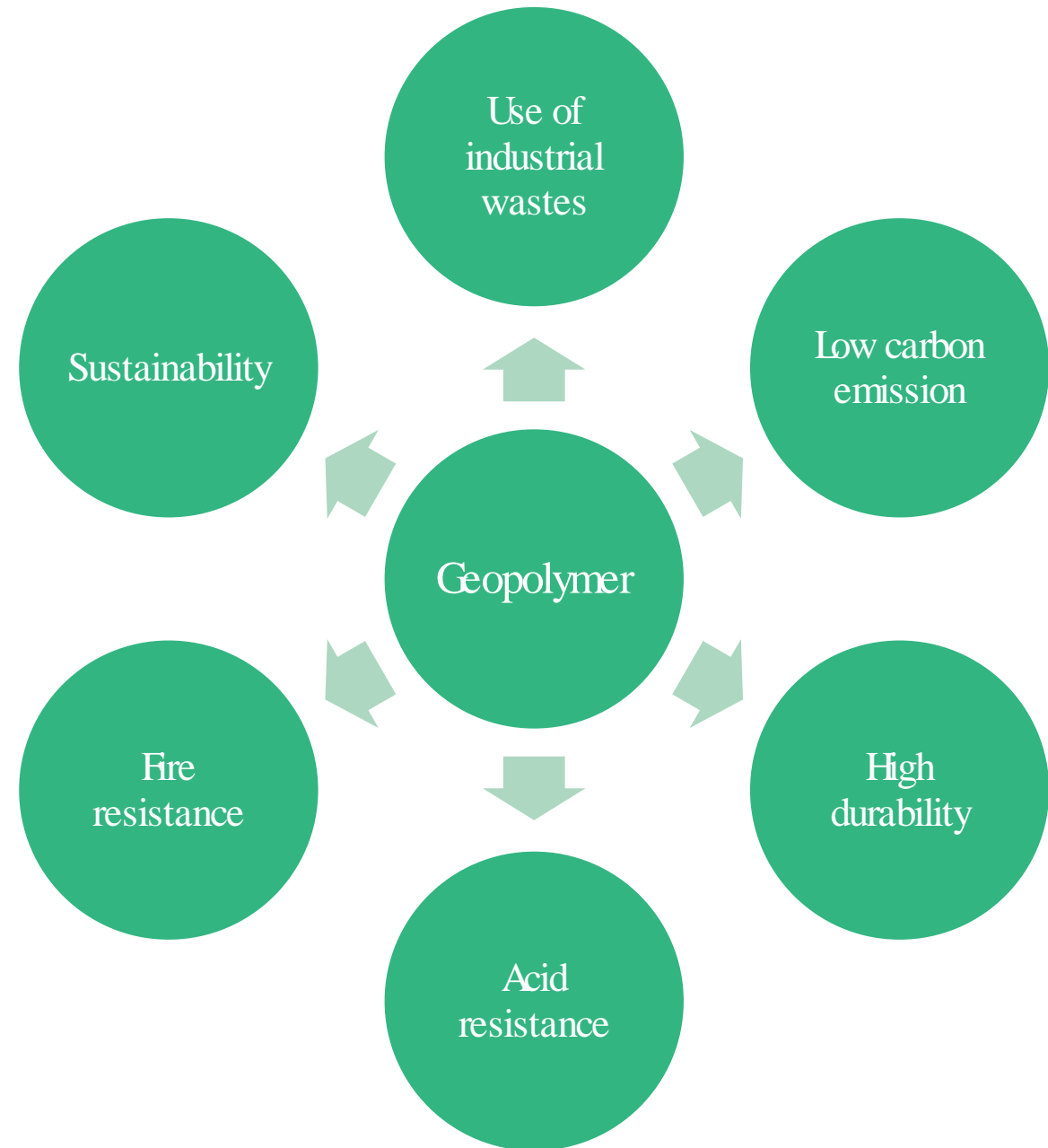
Figure 5. The geopolymerisation process (Palomo and Fernández-Jiménez, 2001)



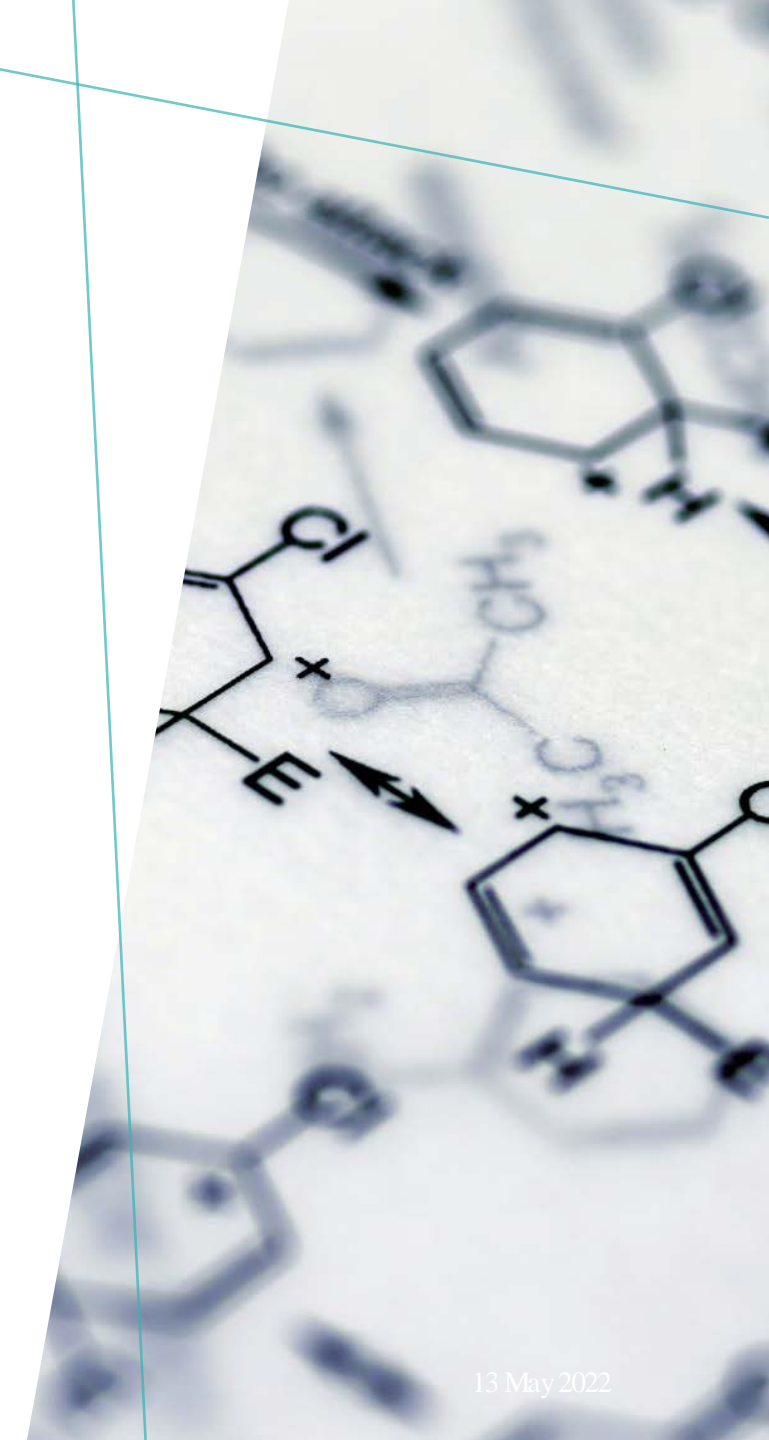
POTENTIAL USES OF GEOPOLYMER


Figure 6. Potential applications of geopolymer composites (Ranjbar and Zhang, 2019)

ADVANTAGES OF GEOPOLYMERS

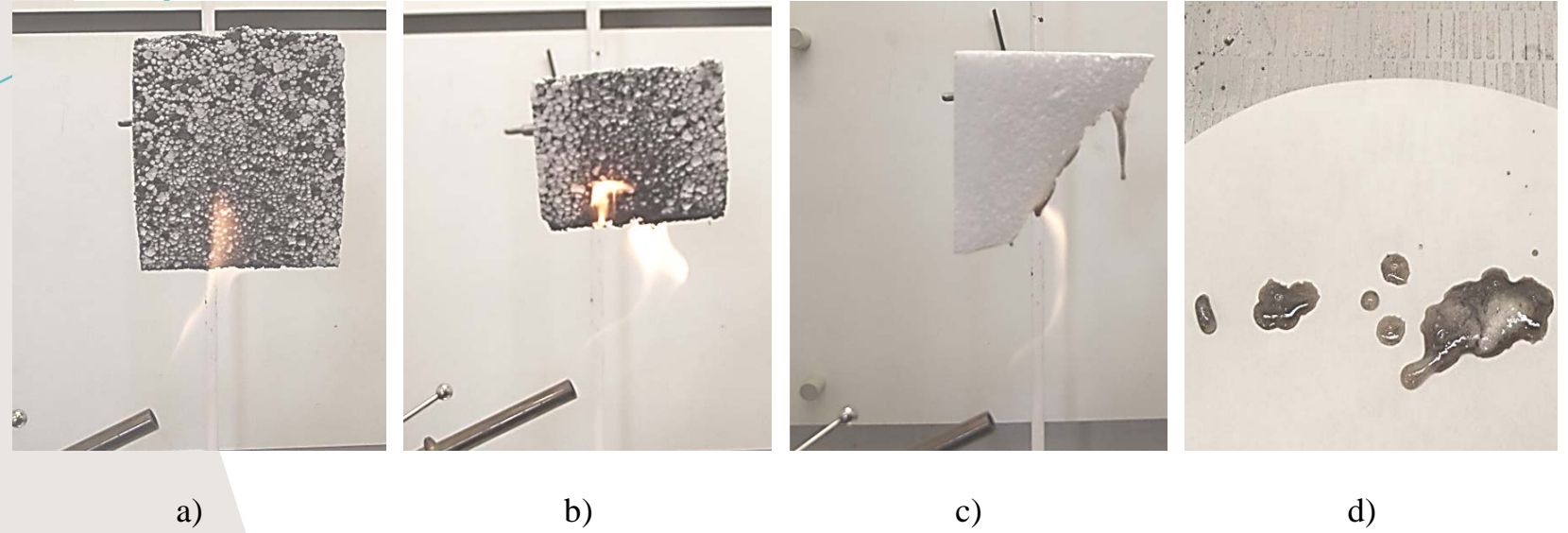


FLY ASH-BASED GEOPOLYMER DEVELOPMENT AT THE UNIVERSITY OF MISKOLC





GEOPOLYMER
CONCRETE FROM FLY
ASH AND STEEL
CONVERTER SLAG



GP-POLYSTYRENE WASTE COMPOSITE, FIRE RESISTANT HEAT INSULATING MATERIAL

Figure 7. GP-polystyrene waste composites (Mucsi et al., 2017)

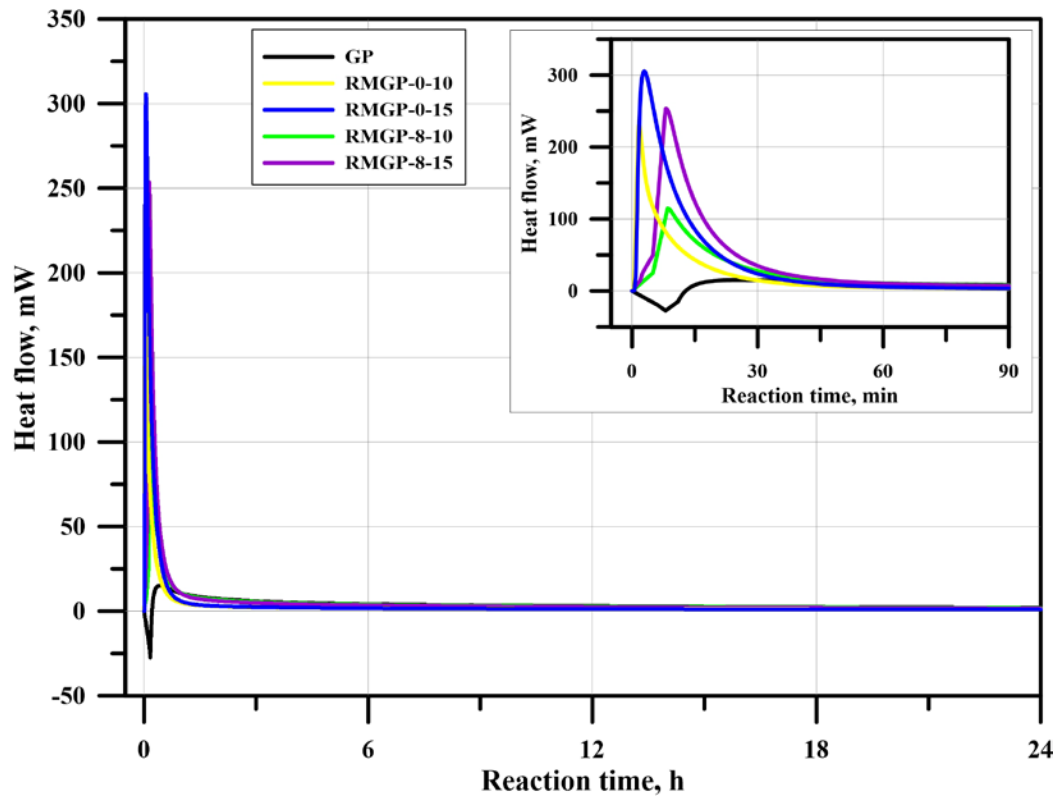


Figure 8. Examined red mud – fly ash based GP composite samples (Ambrus, 2020)

FLY ASH – RED MUD BASED GEOPOLYMERS

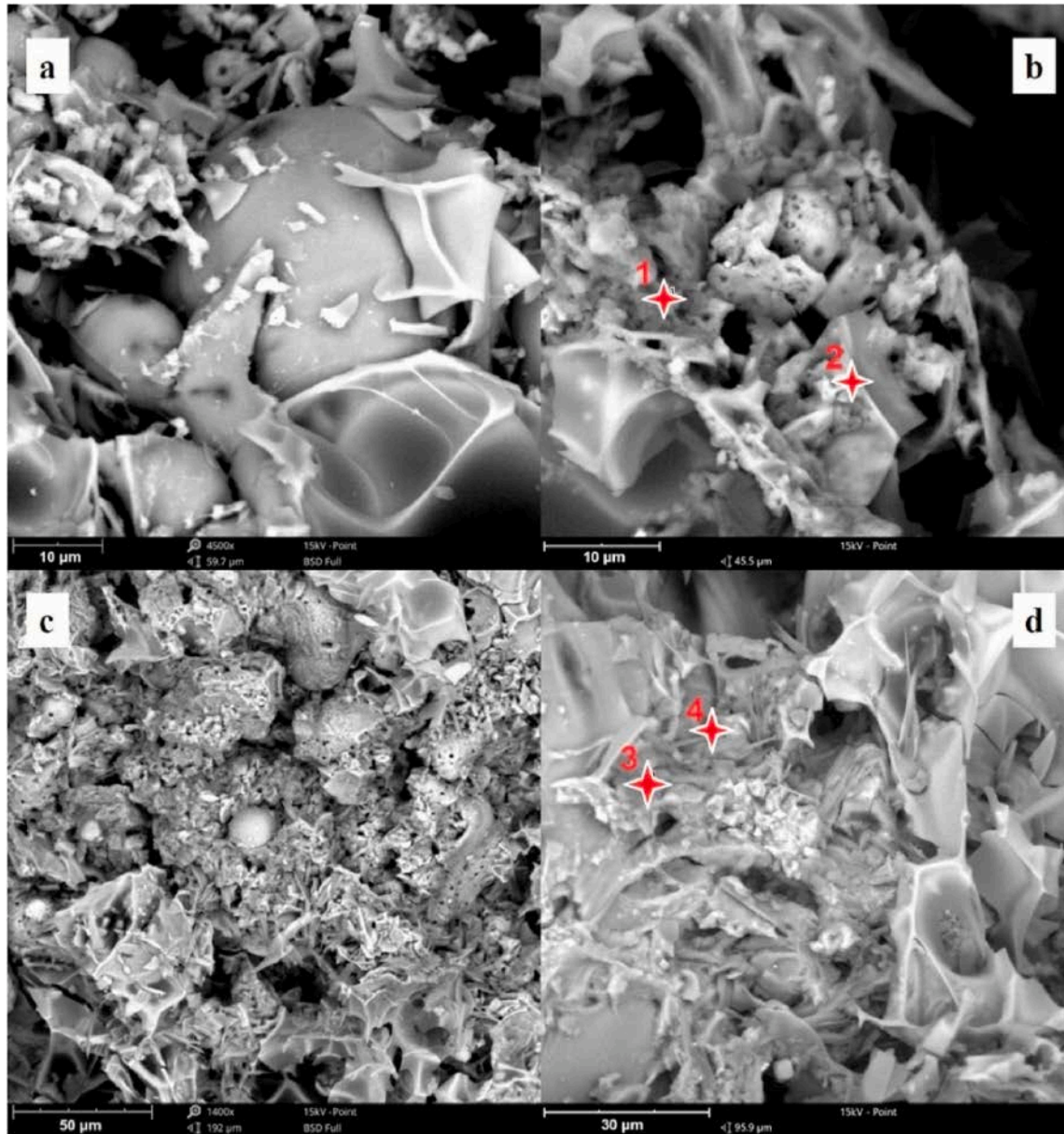


Figure 9. SEM micrographs of composite with 95% vol. of EP (a–b) and 80% vol. of EP (c–d) (Szabó et al. 2022)

FLY ASH – EXPANDED PERLITE BASED GEOPOLYMERS



Figure 10. Biomass fibre reinforced GP composites (Ambrus et al. 2020)

FLY ASH – BIOMASS BASED GEOPOLYMERS

FIBER REINFORCED GEOPOLYMER FROM WASTE TYRES

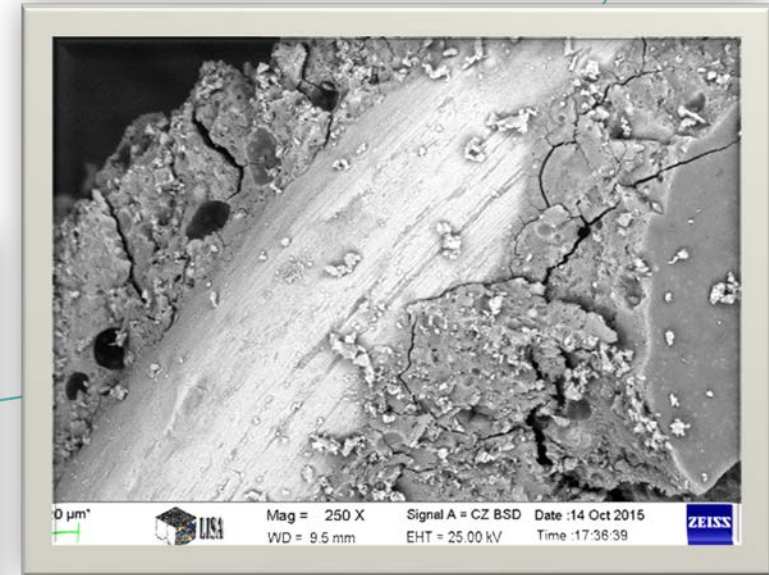
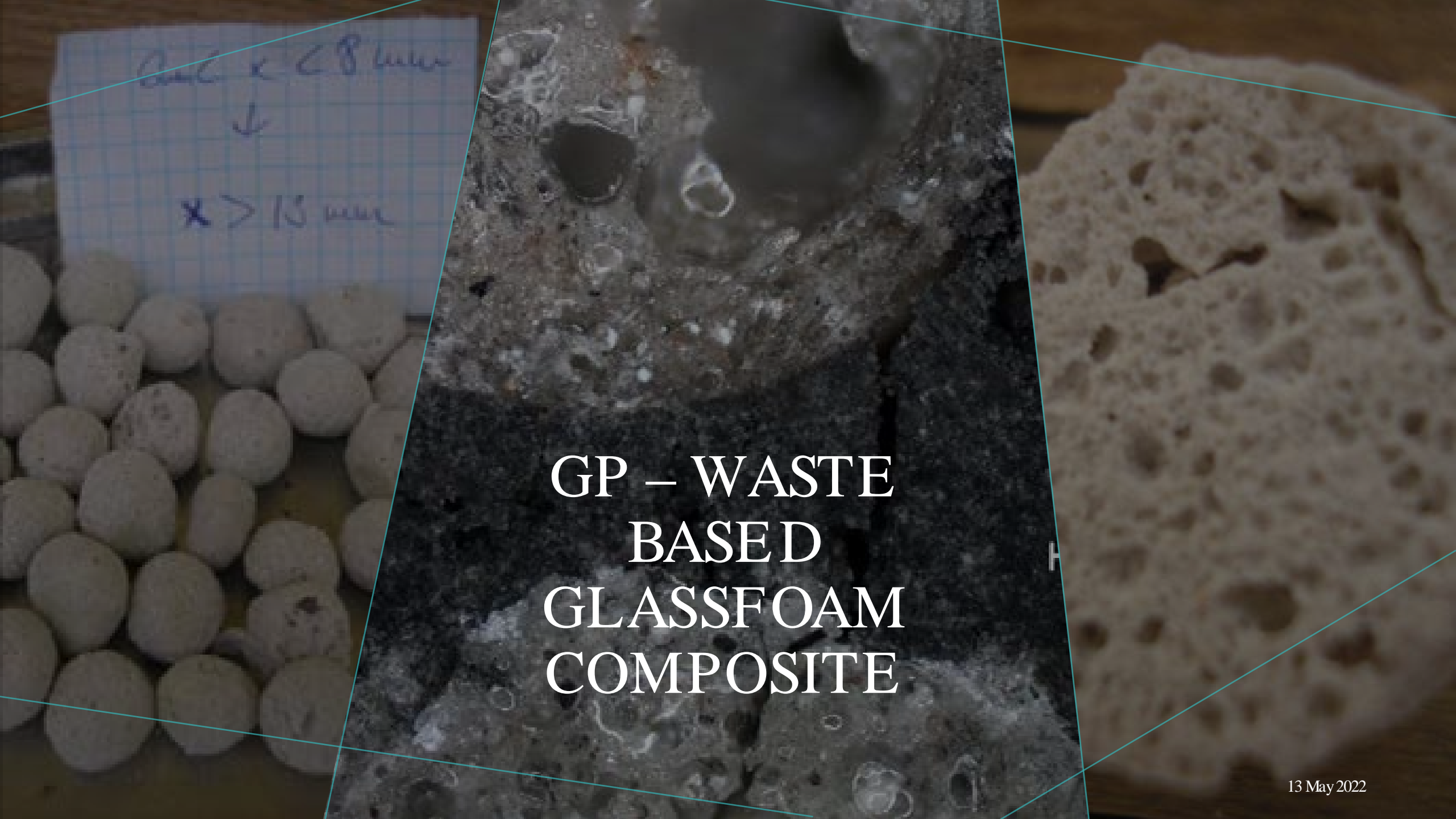


Figure 11. The magnetic separator, the separated fibres and SEM of the GP composite (Mucsi et al., 2018)



GP – WASTE BASED GLASSFOAM COMPOSITE

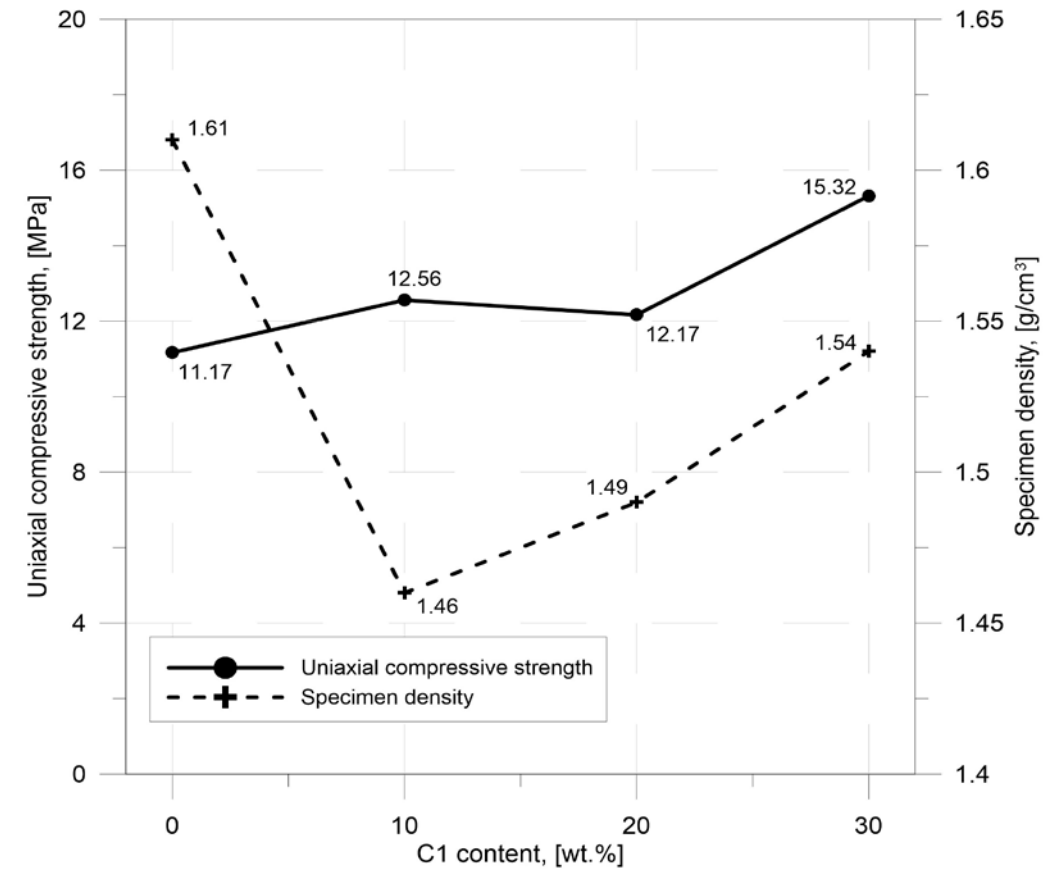
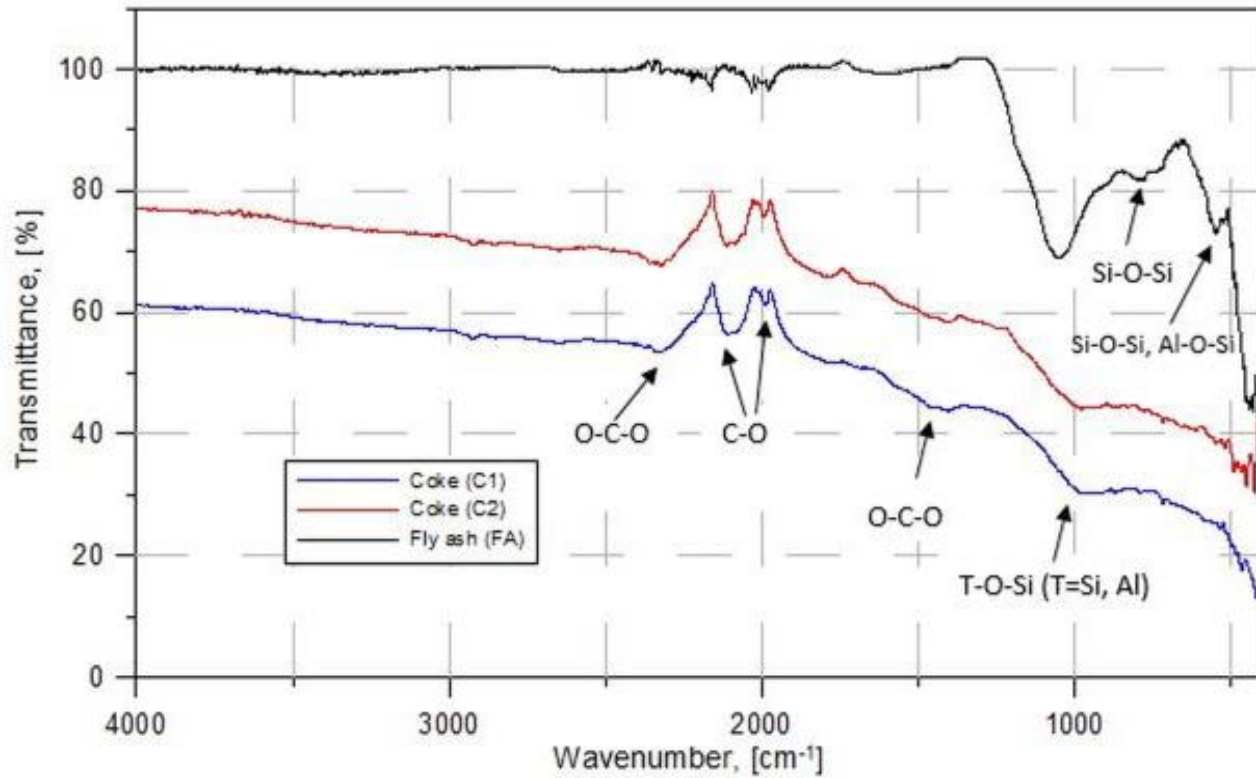


Figure 12. FTIR spectra of the base materials and experimental results (Mucsi et al., 2018)

COAL GASIFICATION RESIDUE AND FLY ASH AS GEOPOLYMER BASE MATERIAL

FINAL REMARKS

1

Coal is a major part of the energy mix around the world

2

High amount of fly ash is produced, the utilisation is still low in many countries

3

Geopolymerisation is a promising new method for the use of industrial by-products

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**THANK YOU FOR
YOUR ATTENTION!**