

# Preparation of functional carbon materials by pyrolysis of waste coffee grounds

**DANI  
DOKTORATA  
BIOTEHNIČKOG  
PODRUČJA**

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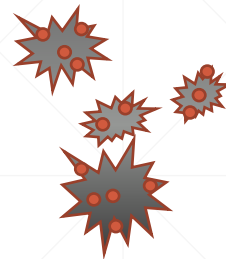
Faculty of food technology and biotechnology

# Biomass, pyrolysis and functional carbon materials

- Functional carbon materials – what do we need for biocatalysis?
- Pyrolysis as a direct way of obtaining functional carbon materials – catalytic?
- Coffee grounds as an ideal form of waste biomass feedstock



Pretreatment

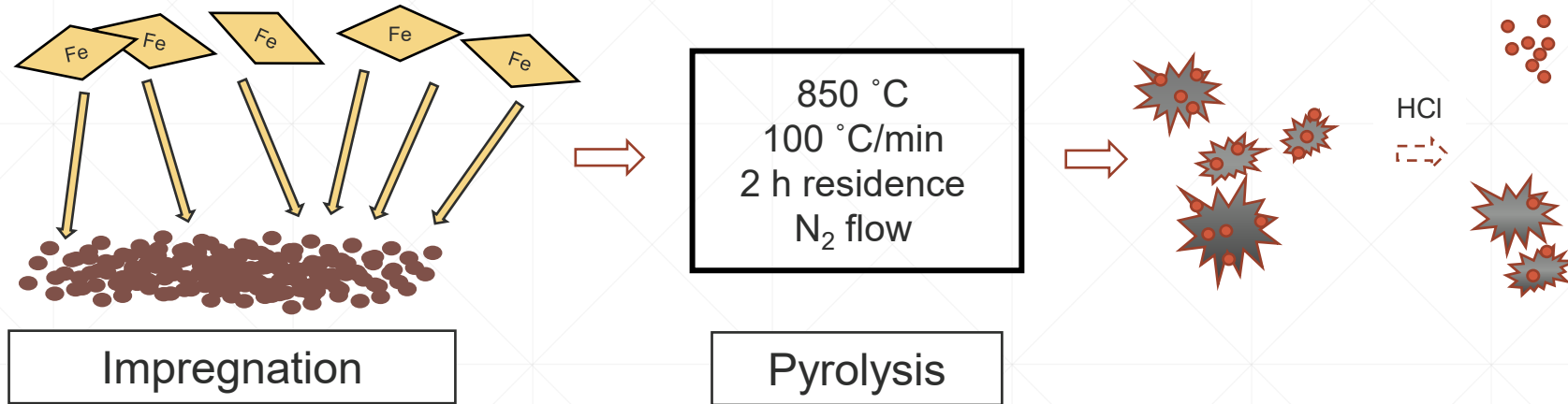


Posttreatment





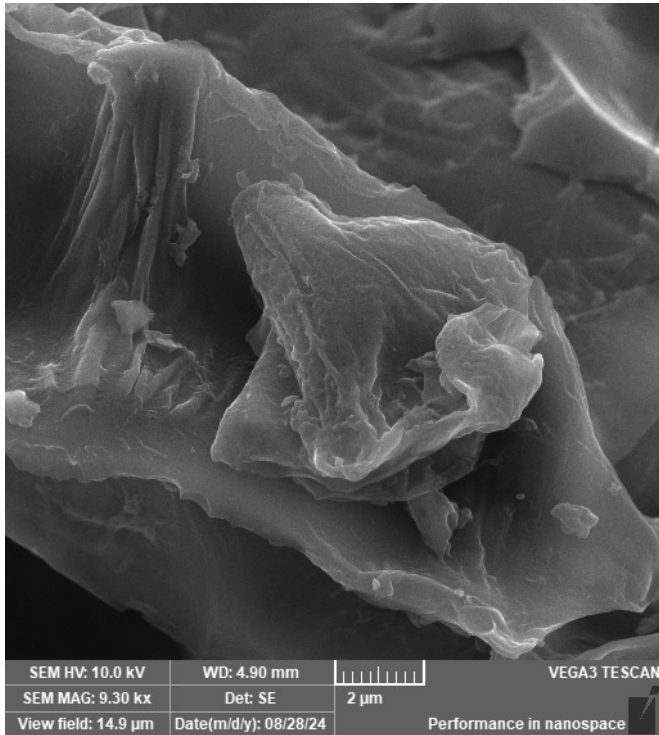
## What did we do?



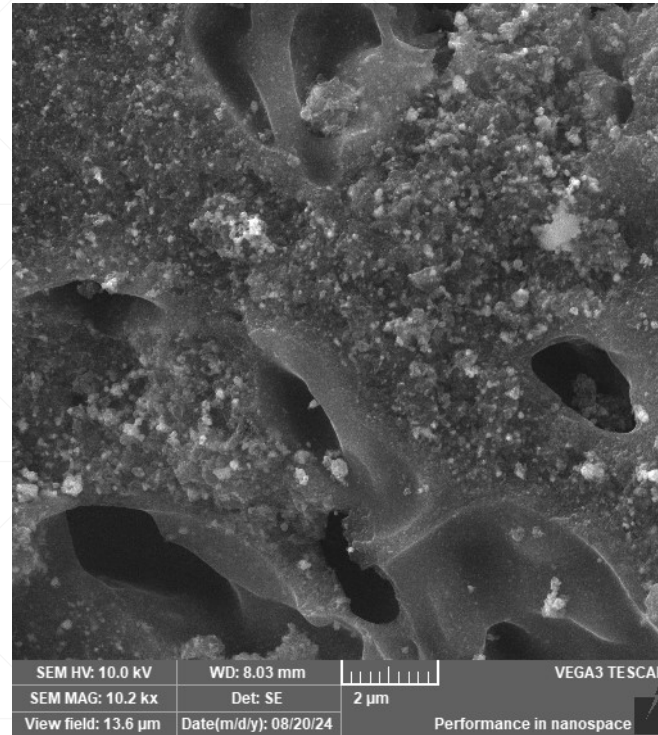
So, what did we really get?



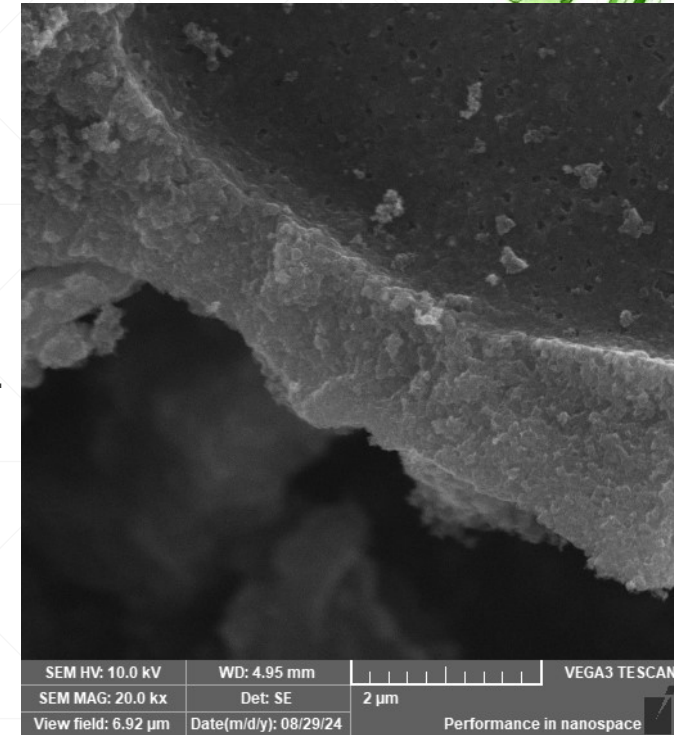
# Let's see the morphology!



VS.



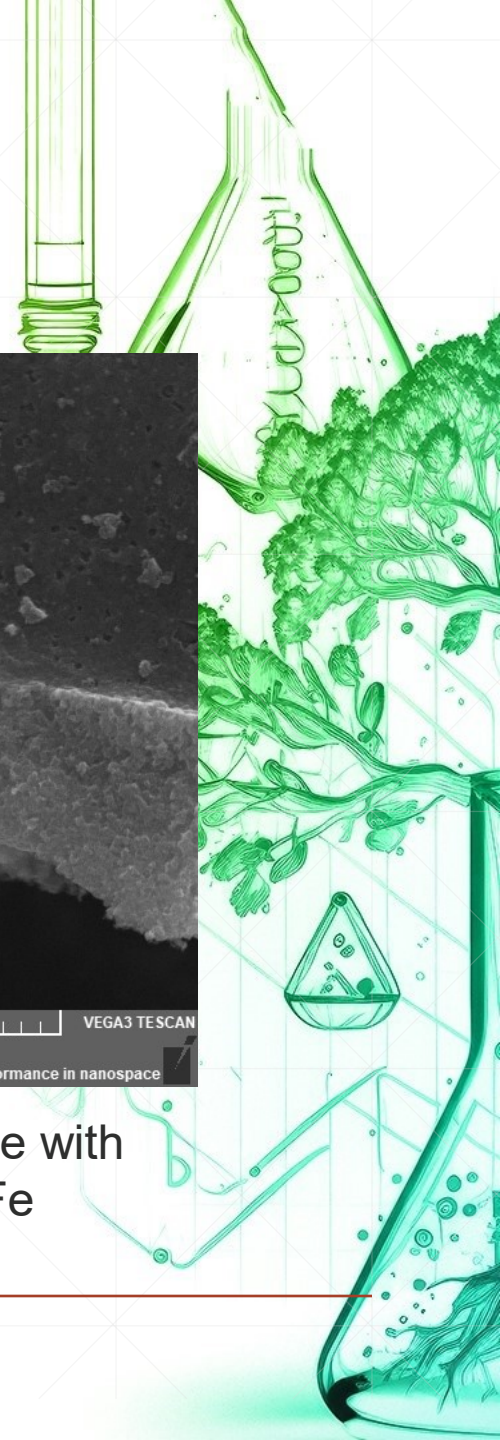
VS.



Non-impregnated coffee  
(control)

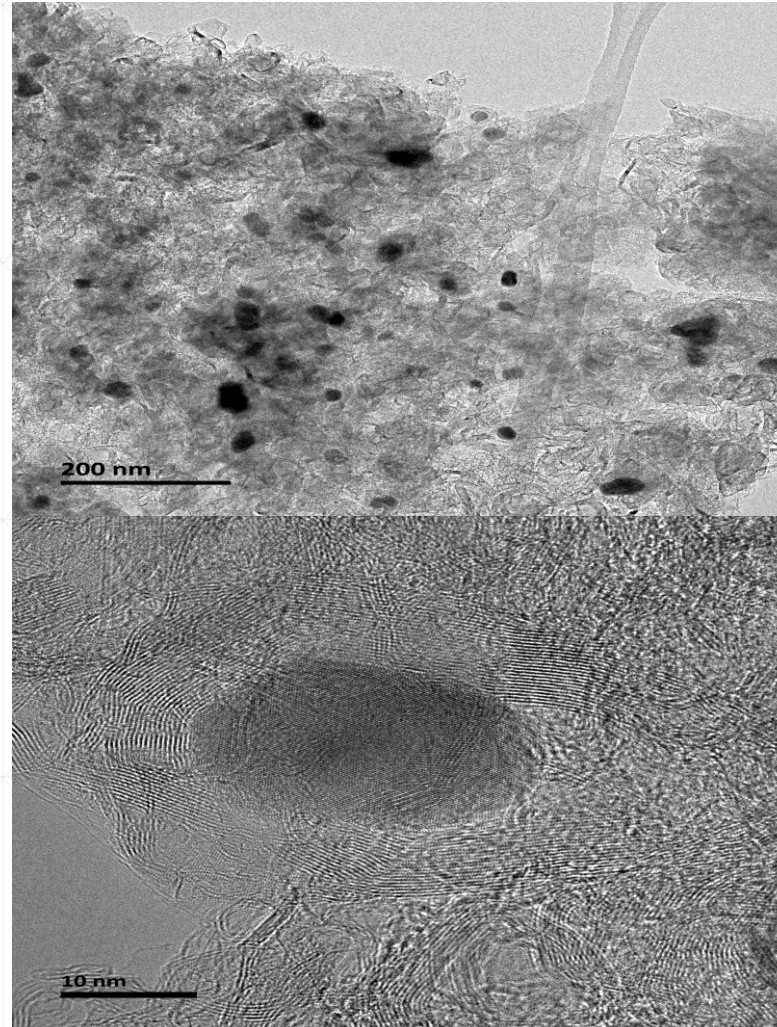
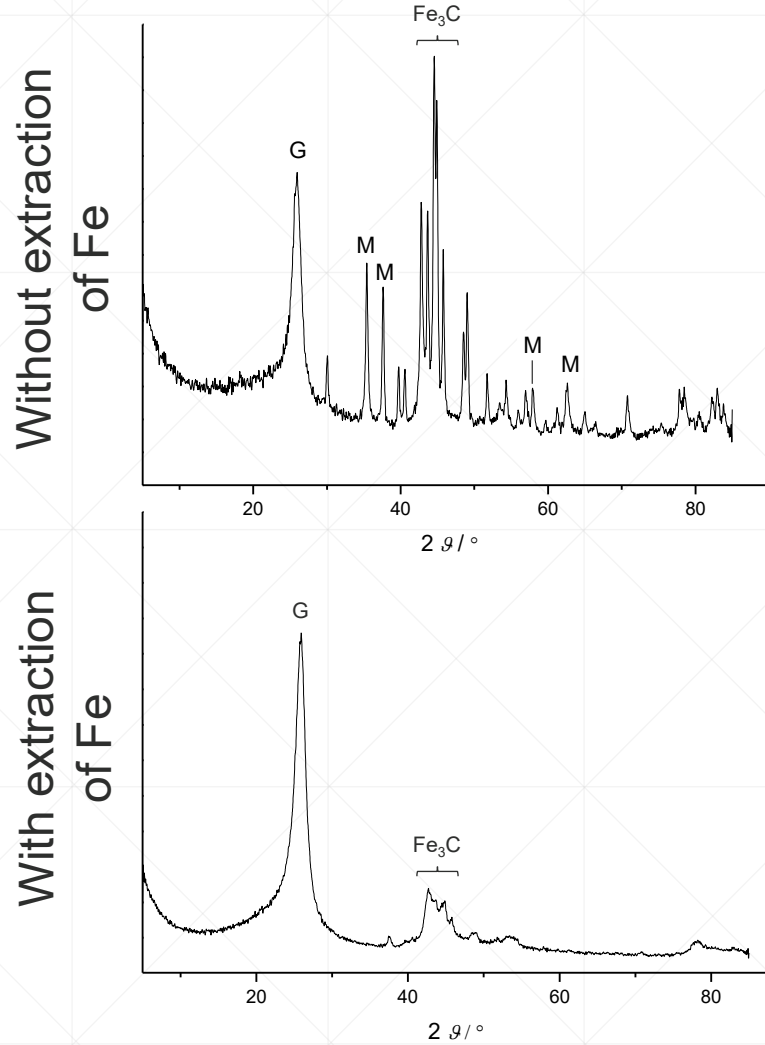
Impregnated coffee  
without Fe extraction

Impregnated coffee with  
extraction of Fe





# What about the structure?





# Next steps?

1. Functionalisation of surface with diazonium salt
2. Activation of carboxyl group
3. Attaching the enzymes
4. Biocatalysis
5. Separation



# Future prospects

- What about electrocatalysis?

Alginate gels!

- What about alternative methods of obtaining carbonaceous materials?

Hydrothermal carbonisation!

