# MONITORING OF BIOMASS AND BIOFUELS CONTRIBUTION TO ATMOSPHERIC POLLUTION USING NUCLEAR TECHNIQUES

Mirjana Radenković, Dusan Topalović, Mirjana Ćujić and Antonije Onjia

*[1]University of Belgrade, Vinča Institute of Nuclear Sciences, National Institute of the Republic of Serbia, University of Belgrade, Belgrade, Serbia. [2]R*

*[2]University of Belgrade, Faculty of Technology and Metalurgy, Belgrade, Serbia*

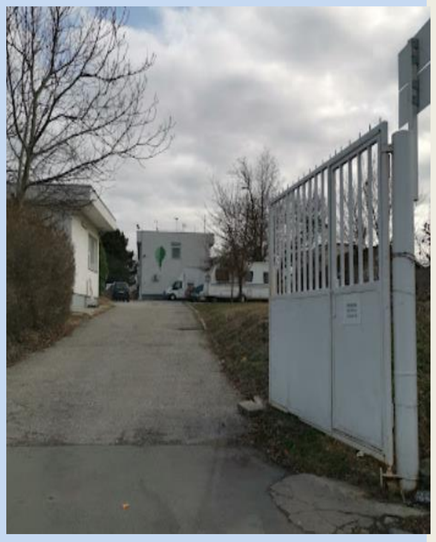
## Introduction

The utilization of "green energy fuels" as prevent for diminishing potential environmental pollution levels are assessed. Biomass burning contribution to the PM2.5 aerosol fraction in Belgrade residential area was studied. Daily samples have been collected on PTFE filters over four seasons and analyzed by PIXE and MABI-based (405-1050 nm) non-destructive analytical techniques.

## Sampling and analysis

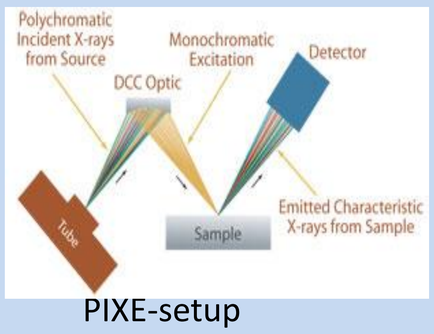
PTFE filters

Sampling site ZB

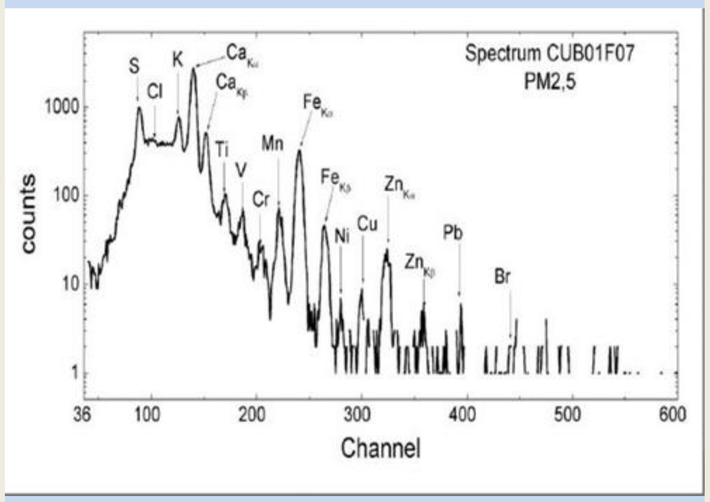


LV Leckel PM2.5 air sampler

MABI (BC)




PIXE-setup

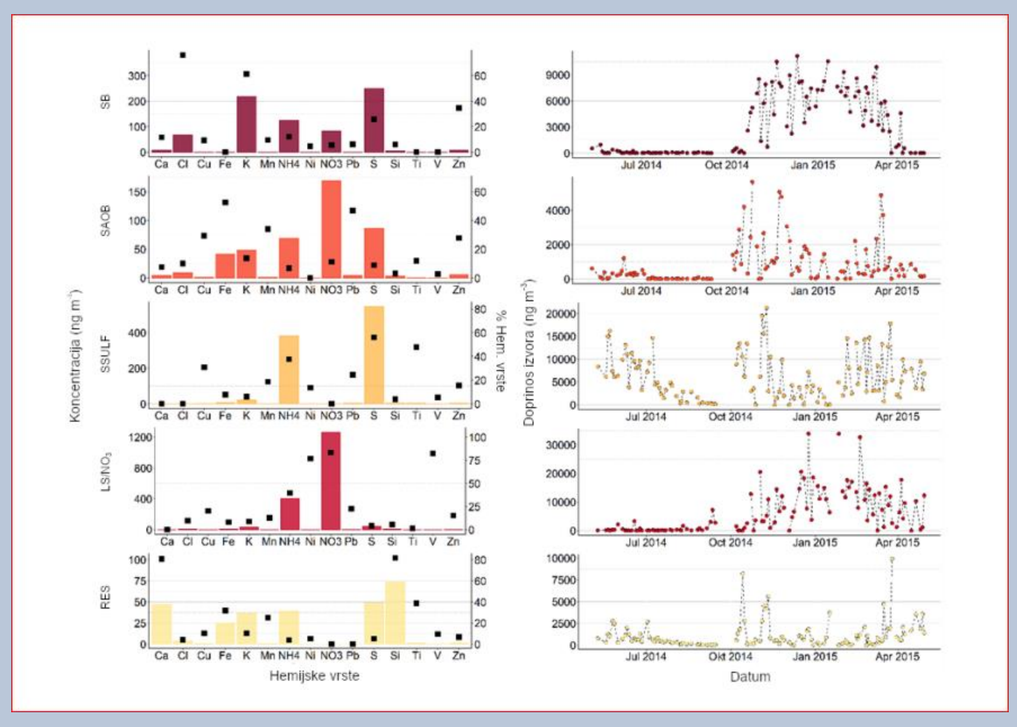



PIXE spectar

## Results and Discussion

- Presence of several biomass and biofuel related tracer elements like Ni, V, Cu, Zn, Ti, Mn, and Cr and significant contents of Pb and Cd, proved detection of mix of energy related emissions.
- Besides the black carbon detected below 600nm, K was recognized as a main tracer for biomass sources like wood and biofuels.
- Positive matrix factorization modeling (EPA PMF 5.0) revealed about 40% of PM2.5 mass belonging to the biomass-related emission sources coming from the energy production sector.

PM2.5 Source profiles and time series – ZB- Belgrade suburban background site




- The V/Ni ratio, characteristic for heavy oil burning, indicating contribution of industrial emission sources during the summer in addition to its appearance in the heating season.

## Conclusions

- Obtained results support the use of nuclear analytical techniques for analysis as well as development of new tools and techniques for simple and efficient control of biofuel combustion products in emission exhausts.
- Nevertheless, recently encouraged use of the individual biofuels such as biochar, bio-oil, methanol, and crude glycerol, could not be distinguished by applied methodology from the mixed ones.

**Reference:** M .N . Todorović, M.Radenkovic, Lj.M. Ignjatović, A.Onjia Characterization of PM2.5 sources in a Belgrade suburban area: a multi-scale receptor-oriented approach. Environ Sci Pollut Res. (2020)

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