



MORPHOLOGICAL CHARACTERISTICS OF FINE AIR PARTICULATE MATTER COLLECTED IN THE SUBURBAN AREA



¹Mirjana Radenković, ^{2,3}Inga Zinicovscaia, ²Mikhail Kapralov, ¹Dušan Topalović, ¹Mirjana Čujić, ¹Ljiljana Matović

¹Vinca Institute of Nuclear sciences, National Institute of the Republic of Serbia, University of Belgrade, Serbia

²Joint Institute for Nuclear Research, Dubna, Russian Federation, ³Horia Hulubei National Institute for R&D in Physics and Nuclear Engineering, MG-6, Romania

INTRODUCTION

Air quality monitoring in urban and rural areas has revealed the ambient particulate matter as the most harmful airborne pollutant for human health while in addition to the particle composition, their size and shape are crucial for the behavior in the organism.

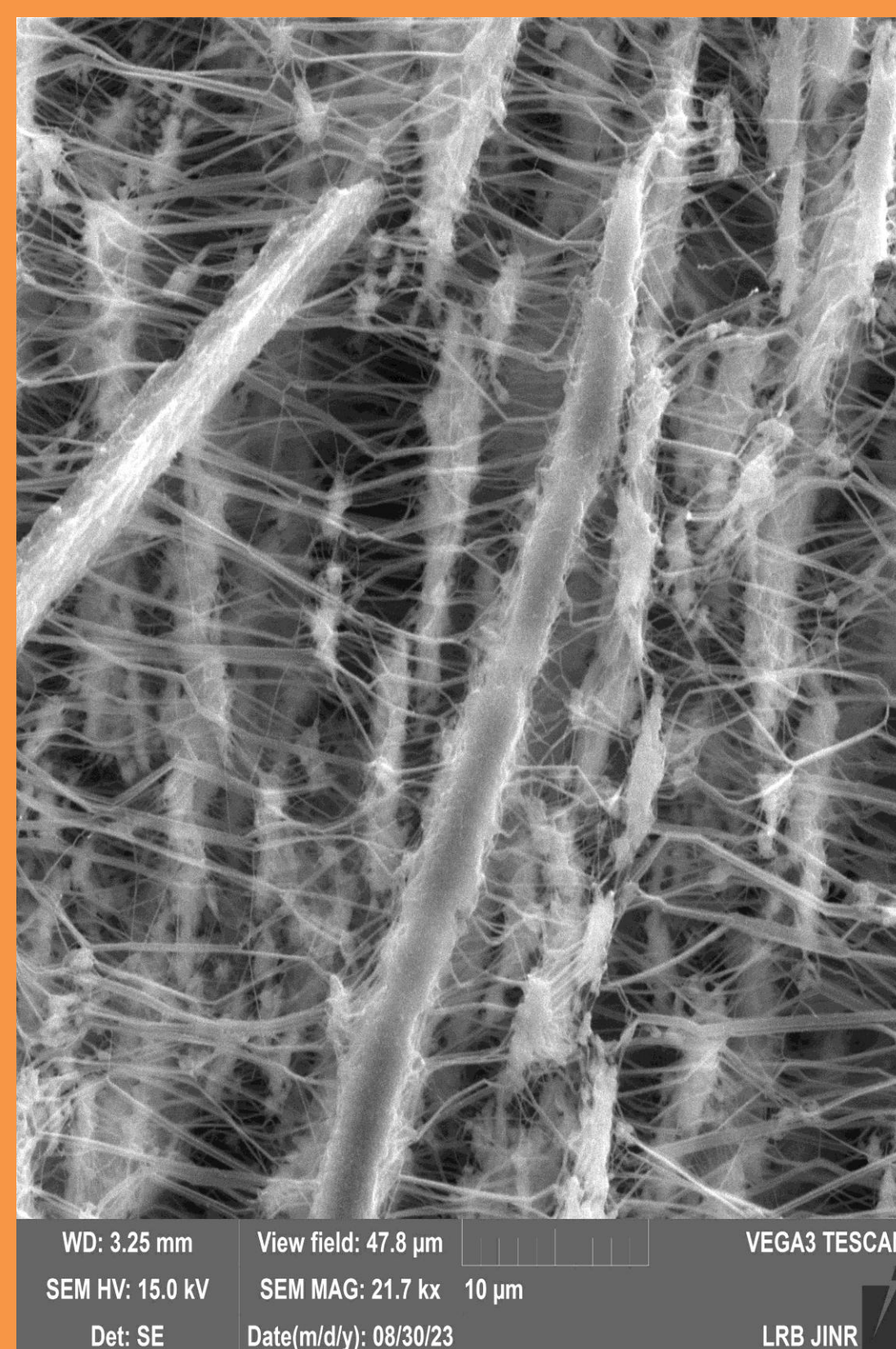
Here are presented selected results of the physicochemical characterization of the submicron particles in the PM_{2.5} aerosol fraction collected at the Belgrade suburban monitoring site Zeleno Brdo.

MATERIALS AND METHODS

Daily (24h) PM_{2.5} samples were collected by Leckel air samplers on the PTFE 47 mm filters in four seasons 2018/19. Particulates were analyzed for mass (0.001 mg resolution) and composition (20 elements) by EDXRF technique.

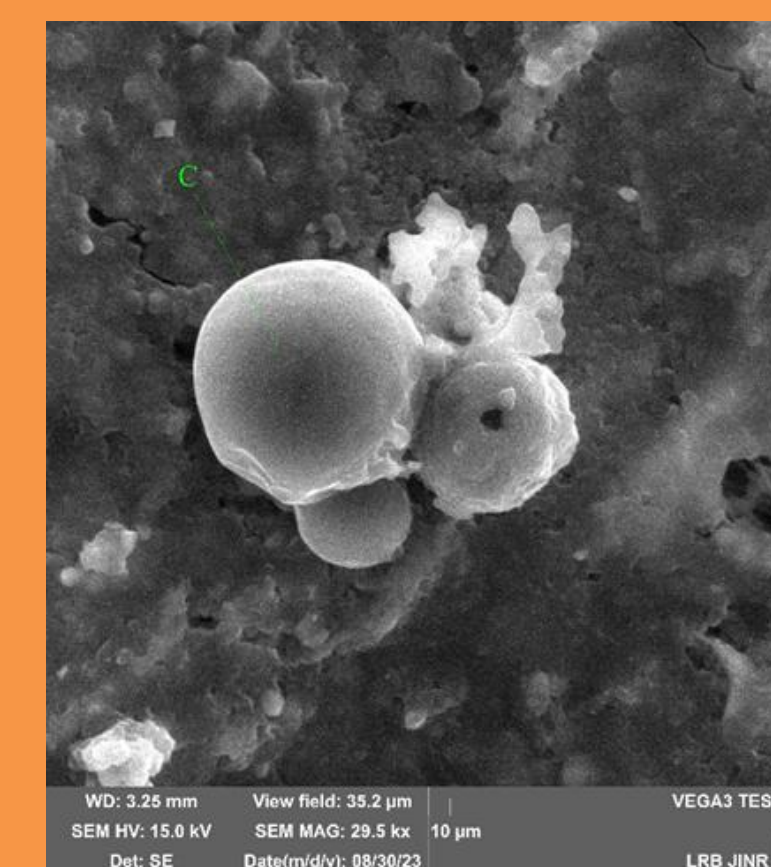
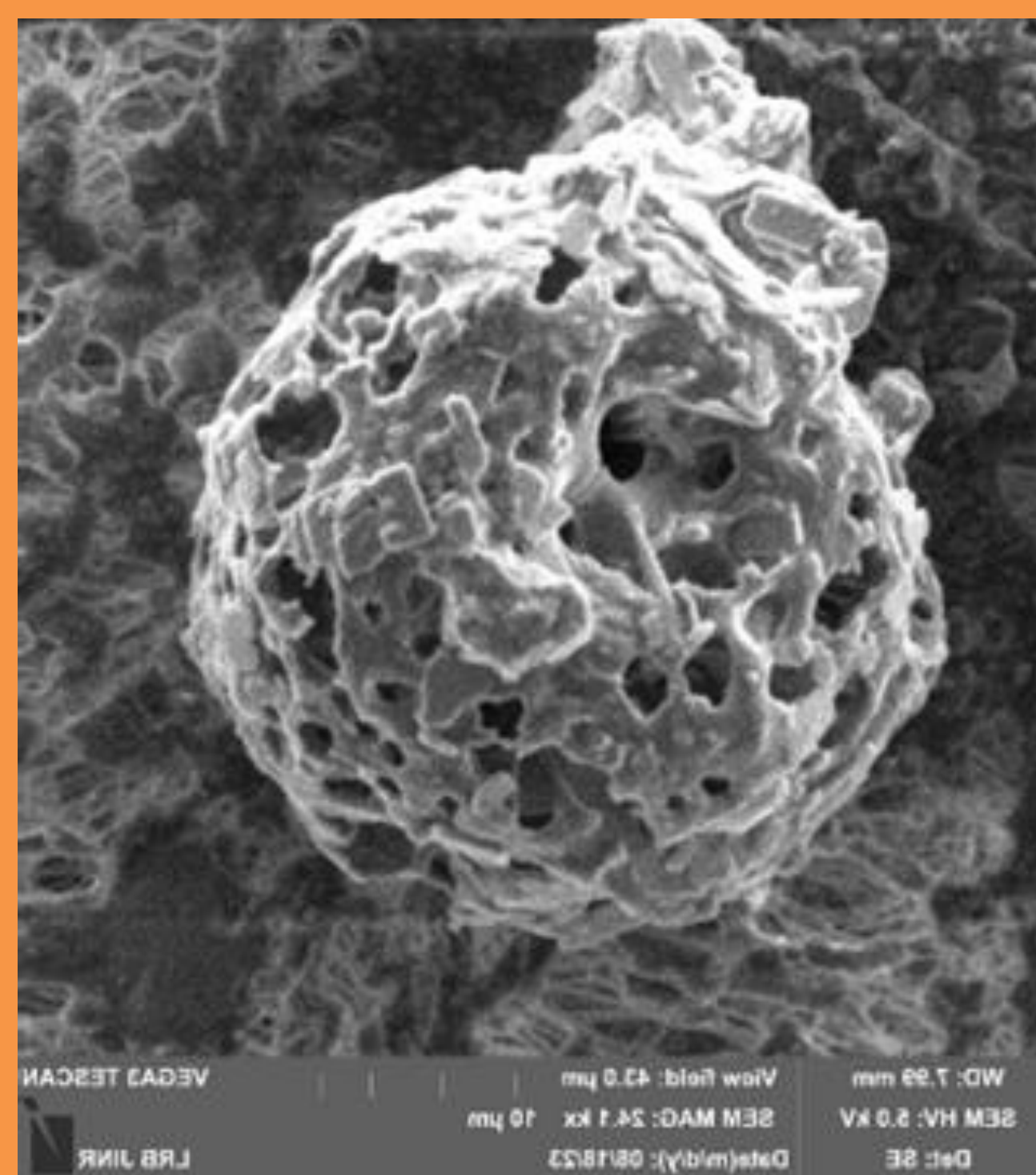
Additionally, selected filters were dried and coated with a thin layer of gold to prevent charging and analyzed by SEM imaging in high vacuum conditions with varying magnifications (e.g., 1,000-50,000) enabling observation of fine details.

RESULTS & DISCUSSION

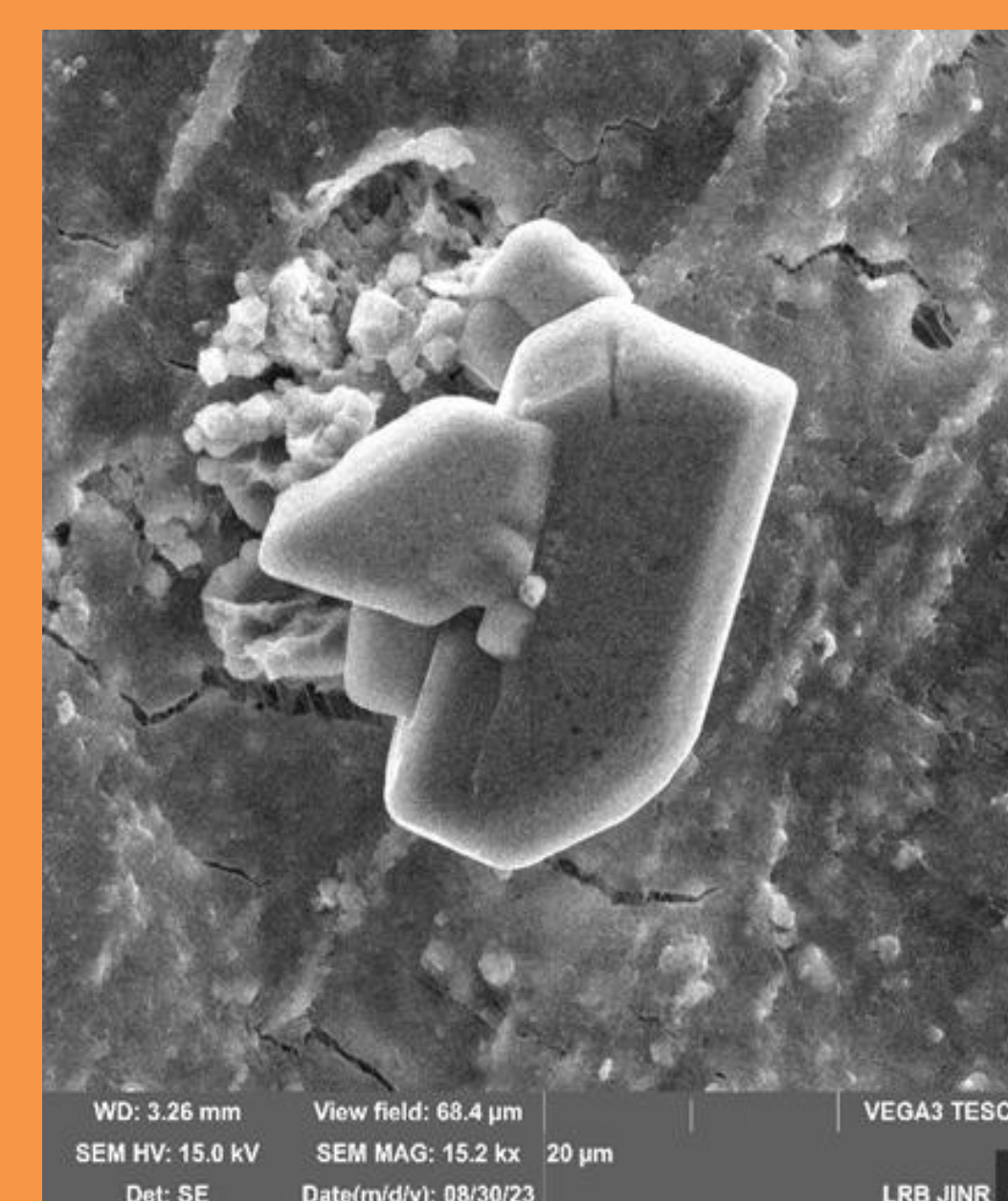


Soot particles are highly aggregated mostly into chain-like structure, while the mineral dust was observed in irregular shapes with jagged edges.

The secondary aerosols such as sulphates and nitrates formed in mutual interactions of smaller air particles with emitted gas pollutants appeared in the form of small spherical droplets.



Several groups of particles such as carbon-based compounds (C, O, S and N), metal-rich particles (Fe, Pb, Zn, Cu, Ni, Cd) and crustal elements (Si, Al, Mg, Ca, K, Na) have been recognized and further characterized.



CONCLUSIONS

Typical size range of observed structures was between 100 nm to 2.5 µm, with aggregation forming larger clusters. The most are irregular and agglomerated with porous flakes, such as crustal material with well recognized spherical and rectangular shapes

The results indicate a high degree of the secondary aerosols formation due to a long half-life of small particles in the ambient air exposed to solar radiation and available for physicochemical interactions with local gaseous compounds and transboundary transported pollutants.

High toxicity of recognized individual metal/metalloid particles and their various structure may pose significant health risk if the PM_{2.5} reference levels will be exceeded for long-term in studied residential areas.

REFERENCES

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CONTACT

Mirjana Radenkovic
Vinca Institute,
University of Belgrade
Email: mirar@vinca.rs
Website:
www.vin.bg.ac.rs

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