



ZAJEDNIČKI SEMINAR

Zavoda za fizičku kemiju i Hrvatskog biofizičkog društva

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Institut Ruđer Bošković, Bijenička cesta 54, predavaonica III krilo

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Modelling the single-cell C4 carbon concentrating mechanism in higher plants

The C4 carbon concentrating mechanism evolved multiple times in varied plant lineages as a response to lowered atmospheric CO₂ levels. Commonly, the evolution of this mechanism proceeds through cell specialisation and characteristic changes to leaf geometry – the so-called Kranz anatomy. However, in a couple of lineages the C4 mechanism is established on the level of individual mesophyll cells. The discovery of this single-cell mechanism variant was a surprise as strong barriers to gas diffusion were considered essential for efficient CO₂ concentration. In plants with Kranz anatomy multiple cell walls are used for the purpose, but in the single-cell C4 plants such barriers are absent. I will present a biophysical model of a single-cell C4 mechanism in a particular genus (*Bienertia*) that explicitly focuses on spatial aspects. i.e. the cell geometry. The model shows how the efficiency of the concentrating mechanism depends on the cell size and predicts a minimal size needed for a viable and stable C4 mechanism which matches the observed development of *Bienertia* mesophyll cells. I will discuss the relevance of these results for efforts to re-engineer the C4 mechanism into C3 crop plants.

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I. Jurić graduated physics at the Zagreb university in 2005, and received a PhD from the same institution in 2013 for his work on the modelling of charge transport in amorphous organic semiconductors under mentorship of dr. Eduard Tutiš at the Institute of Physics. He is currently a postdoc at University of Warwick, where he works with Prof. Nigel Burroughs on the modelling of gas transport and carbon fixation in plants.