

Visegrad Grant No. 21720055:

Algal cell biophysical properties as markers for environmental stress in aquatic systems

Major challenges face the aquatic systems due to different human activities, which may cause substantial damage to the economy of the region (fisheries, tourism). Our common regional challenge is focused on analyzing pressure in aquatic environment and requires transnational action as recognized in EU Biodiversity Strategy 2020.

Single-celled algae play a fundamental role in the aquatic ecosystem and they are very sensitive to environmental changes. In addition to their ecological roles (oxygen producers, food web), they are economically important (biofuel, human food, pharmaceutical and industrial products). Deep understanding of algal cell physicochemical response is essential to predict how the whole ecosystem may be affected by human activities.

Physicochemical and structural characterizations of single algal cell surface are of key importance to interpret, rationalize and predict the behavior and fate of the cell under stress *in vivo*. We aim to examine the *in vitro* algal cell response under specific stress conditions (variation of salinity and heavy metals). We will look into cell surface mechanical properties (linked to adhesion dynamics and motility), as well as the membrane protein expression and cell autofluorescence. Such properties of soft and motile cells are hard to access while keeping cells viable and the studies to date are limited. Innovative comprehensive approach with state-of-the-art biophysical methods such as atomic force microscopy, nanoindentation, electrochemistry, spectroscopy and modelling will be employed.

Our solution necessitates regional collaboration to gain immediate access to the specific equipment and complementary expertise.

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- **Visegrad Fund**

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Our Visegrad project, is the first project originated from the [COST ACTION CA15126](#) presenting good example of networking.