NUS National University of Singapore | Department of Biological Sciences, Faculty of Science

ON-SITE BIOLOGY COLLOQUIUM

Friday, 6 Feb 2026 | 4 pm | S3 05-02 Conference Room 1

Hosted by Associate Prof Lau On Sun

Map to Block S3

Environmental signals and stomatal control: the hidden role of guard cell starch and sugars

By **Diana Santelia**

ETH Zurich

Stomata integrate environmental and endogenous signals to dynamically regulate gas exchange, thereby balancing carbon assimilation, water use efficiency, and stress responses. While ion fluxes and membrane transport processes have long dominated models of stomatal regulation, increasing evidence reveals a central yet overlooked role for guard cell carbohydrate metabolism. In this talk, I will discuss how guard cell starch and soluble sugars act as dynamic regulators of guard cell function, linking environmental cues - such as light, CO2, biotic and abiotic stresses - to stomatal behaviour. I will highlight recent insights showing that starch turnover in guard cells is rapid, highly regulated, and tightly coupled to sugar transport and signalling. Understanding and manipulating guard cell carbohydrate metabolism may provide novel strategies to engineer stomatal performance, thereby improving water use efficiency and stress tolerance in crops.

About the Speaker

Diana Santelia is a molecular plant physiologist and group leader at ETH Zürich. Her research focuses on the metabolic regulation of stomatal function, with particular emphasis on guard cell starch metabolism, sugar transport, and their integration with environmental and stress signals. By combining genetics, physiology, and cell-resolved imaging approaches, her work has reshaped current views of how carbohydrate metabolism contributes to stomatal dynamics, plant productivity, and stress resilience. Diana's research bridges fundamental plant biology with applied research aimed at improving water use efficiency and crop performance under changing climates. In addition to her research activities, she is actively involved in teaching and academic service, including editorial roles in international plant science journals and contributions to research integrity and training at ETH Zurich. Outside the lab, Diana is a passionate endurance triathlete and enjoys balancing science, sport, and family life with her two boys.