
# Implen Journal Club | February Issue

Welcome to our February issue of the #Implen #JournalClub in 2022.
**Novel Applications: Hot off the Press**

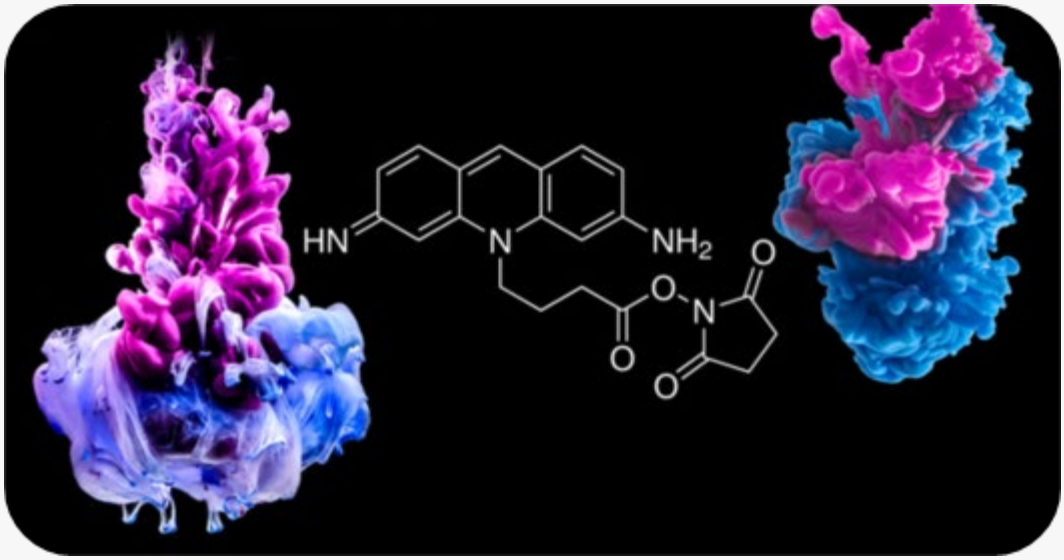

The first issue is exploring the topic of climate change which is increasing the frequency of high temperature shocks and water shortages, pointing to the need to develop novel tolerant varieties of crops. Silvana Francesca et al. reported in the journal of plant biology with results of the exploration of the genetic variability of two genotypes of tomato (LA3120 & E42) to identify candidate genes that could regulate stress responses in response to single and combined abiotic stresses of high temperature and water shortage.

Plant functional traits, pollen viability and physiological (leaf gas exchange and chlorophyll a fluorescence emission measurements), and biochemical (antioxidant content and antioxidant enzyme activity) measurements were carried out and

showed how new tomato genetic resources can be a valuable source of traits for adaptation to combined abiotic stresses and should be used in breeding programs to improve stress tolerance in commercial varieties.

The NanaPhotometer® was used in this work to quantify the accumulation of reactive oxygen species (ROS) and antioxidant compounds by measuring the levels of: hydrogen peroxide (525 nm), malondialdehyde (532 nm, 600 nm), ascorbic acid (525 nm), and glutathione.

Learn more




The second issue of the Implen NanoPhotometer® Journal Club is highlighting the work of Doge it al. published in the journal of histochemistry and cytochemistry the development of a new fluorescent dye to expand the flexibility of Multiplex immunofluorescence (mIF), an effective technique for the maximal visualization of multiple target proteins. This study demonstrated that Atto 465-pentafluoroaniline (Atto 465-p), generates a specific and stable bright nuclear stain in the violet-blue region of the visible spectrum, which expands the flexibility of the mIF panel enabling the quantitative analysis of at least six targets in one tissue sections, and it can be used as an alternative to DAPI in mIF assays in mouse and human cells and tissues.

The NanoPhotometer® N60 was used to perform absorption measurements in the characterization of the novel fluorescent dye Atto465-p in this study.

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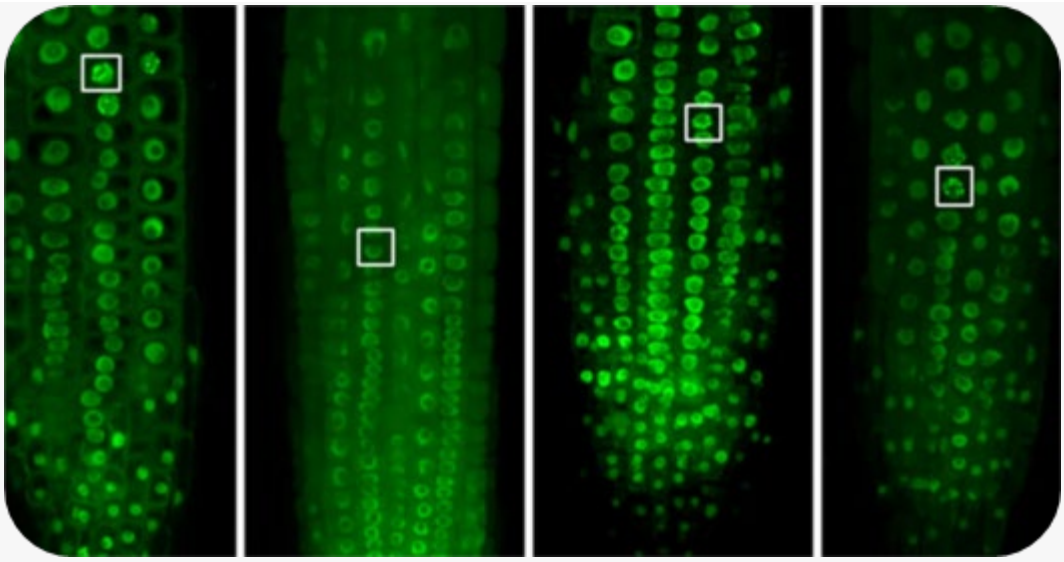
The third issue of the NanoPhotometer® Journal Club is covering the use of the NanoPhotometer in a study reported by Karolien de Wael et al. in Nature's scientific reports of Artemisinin (ART), a vital medicinal compound derived from the plant Artemisia annua, that is used alone or as part of a combination therapy against malaria. This study investigated the DNA binding ability of ART and showed that the antimalarial compound ART binds DNA molecules that contain duplex DNA structures with structure-switching ability, which was exploited using the photochrome aptamer switch assay.

This demonstrated that ART can be detected using this biosensing assay and was the first report of DNA binding to ART. This work should lay the foundation for further work to study implications of DNA binding for the antimalarial activity of ART, as the implication of ART binding these DNA molecules for the role of ART as an antimalarial agent is yet to be revealed.

The NanoPhotometer® N60 was used to verify the concentration of the aptamer for this assay. Extinction coefficients were calculated by the NanoPhotometer NPOS software based on the oligonucleotide sequence.

Learn more



The last issue of the NanoPhotometer® Journal Club is exploring a novel sample preparation method to enable observation of bright and high-resolution fluorescence microscopic images serving as indispensable tools to visualize cellular components, including organelles, proteins, nucleic acids, and small molecules. However, it is often difficult to sufficiently detect the fluorescent signals of fluorescent proteins (FPs) emitted from the internal regions of three-dimensionally thick tissues because autofluorescent pigments absorb the light and some cell components, which refract or reflect light, scatter and disturb the signals.

Sakamoto et al. reported in the nature communications biology journal an improved TOMEI method (iTOMEI) developed to remove chlorophylls and reduce the signal of fluorescent proteins to reduce background in the fluorescent imaging designed to observe tissue deeply embedded in thick biological organs. iTOMEI enables the detection of much brighter fluorescence than previous methods shown to successfully perform deep imaging in plant tissues. In addition, it was shown that iTOMEI could be expanded to animal tissues with the iTOMEI-brain method resulting in the detection of strong fluorescent signals in cleared brain tissue.

The NanoPhotometer® was used in this study to measure the absorbance of chlorophylls at 674 nm.

Learn more

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