

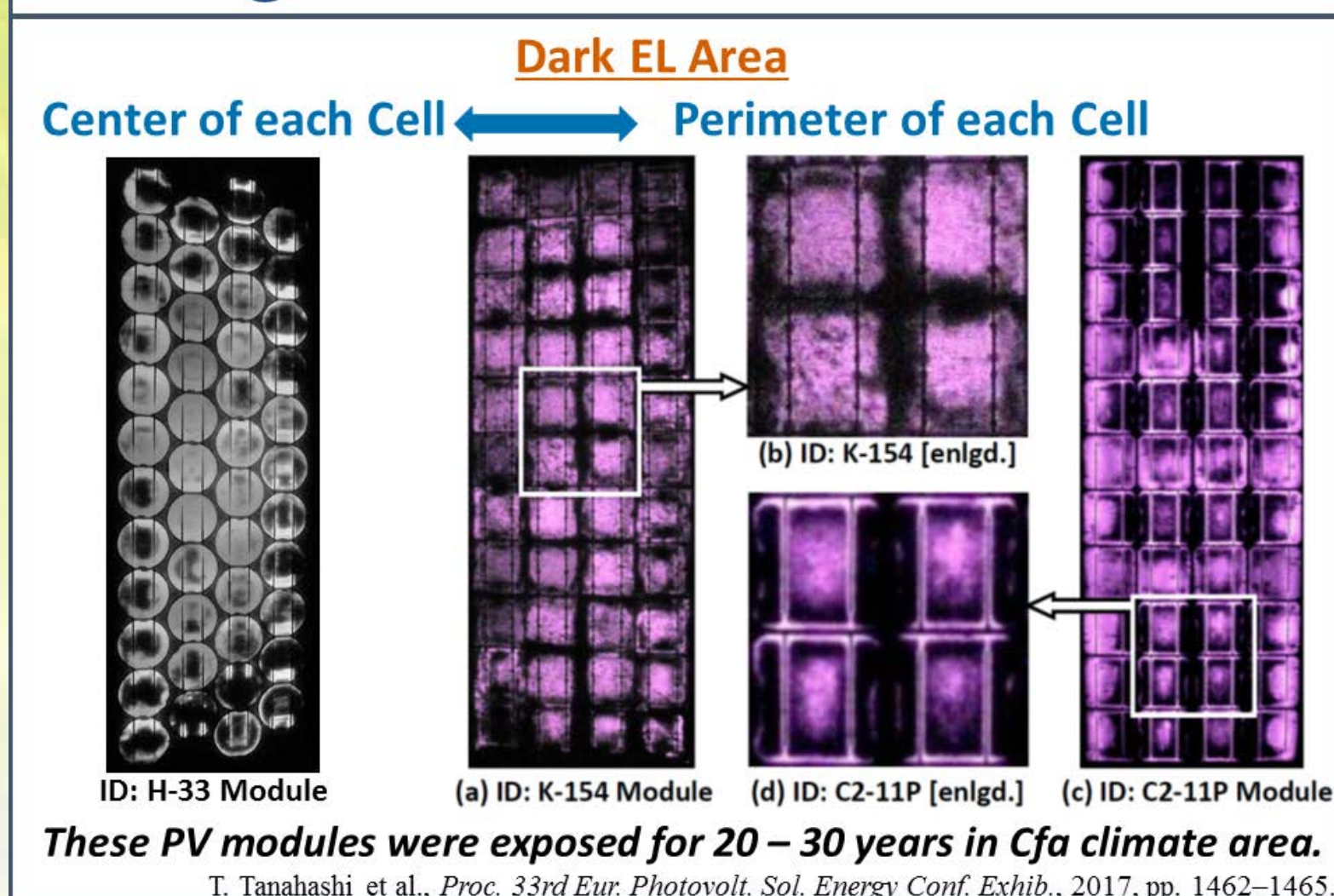
c-Si太陽電池セル／モジュールの腐食過程における交流インピーダンス変化

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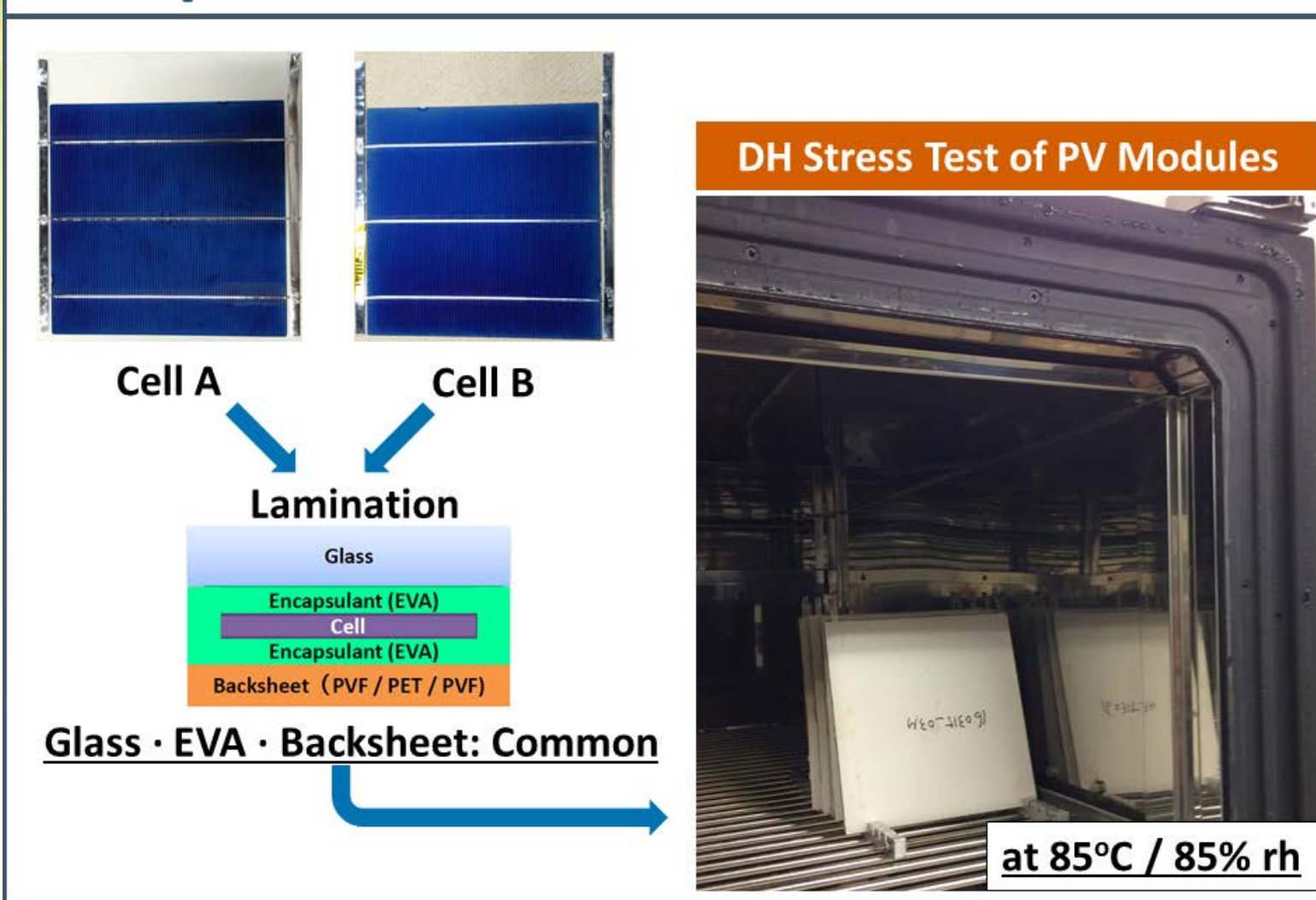
産業技術総合研究所 ¹太陽光発電研究センター、 ²計量標準総合センター

Background & Experimental

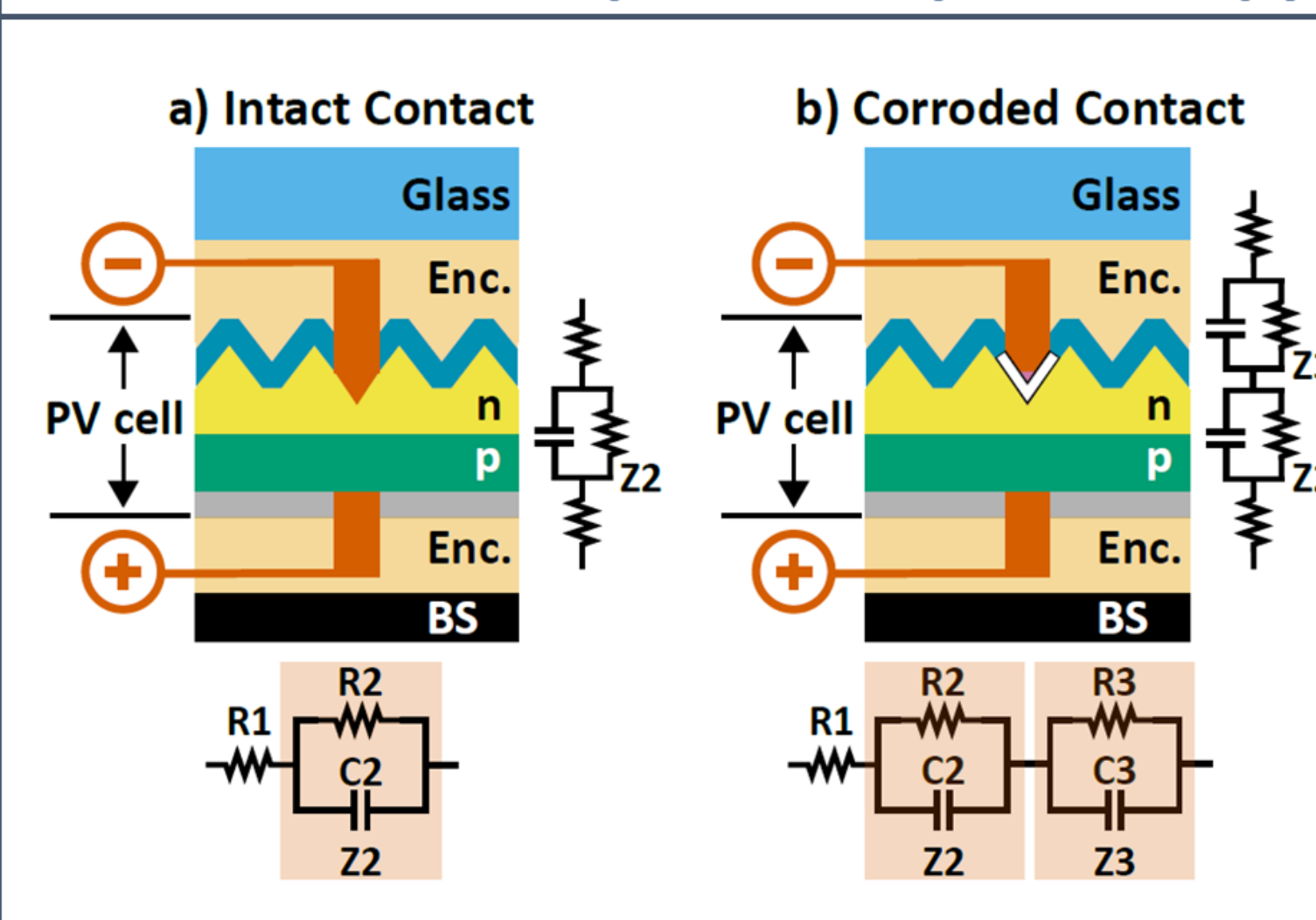
EL Images in the Fielded PV Modules



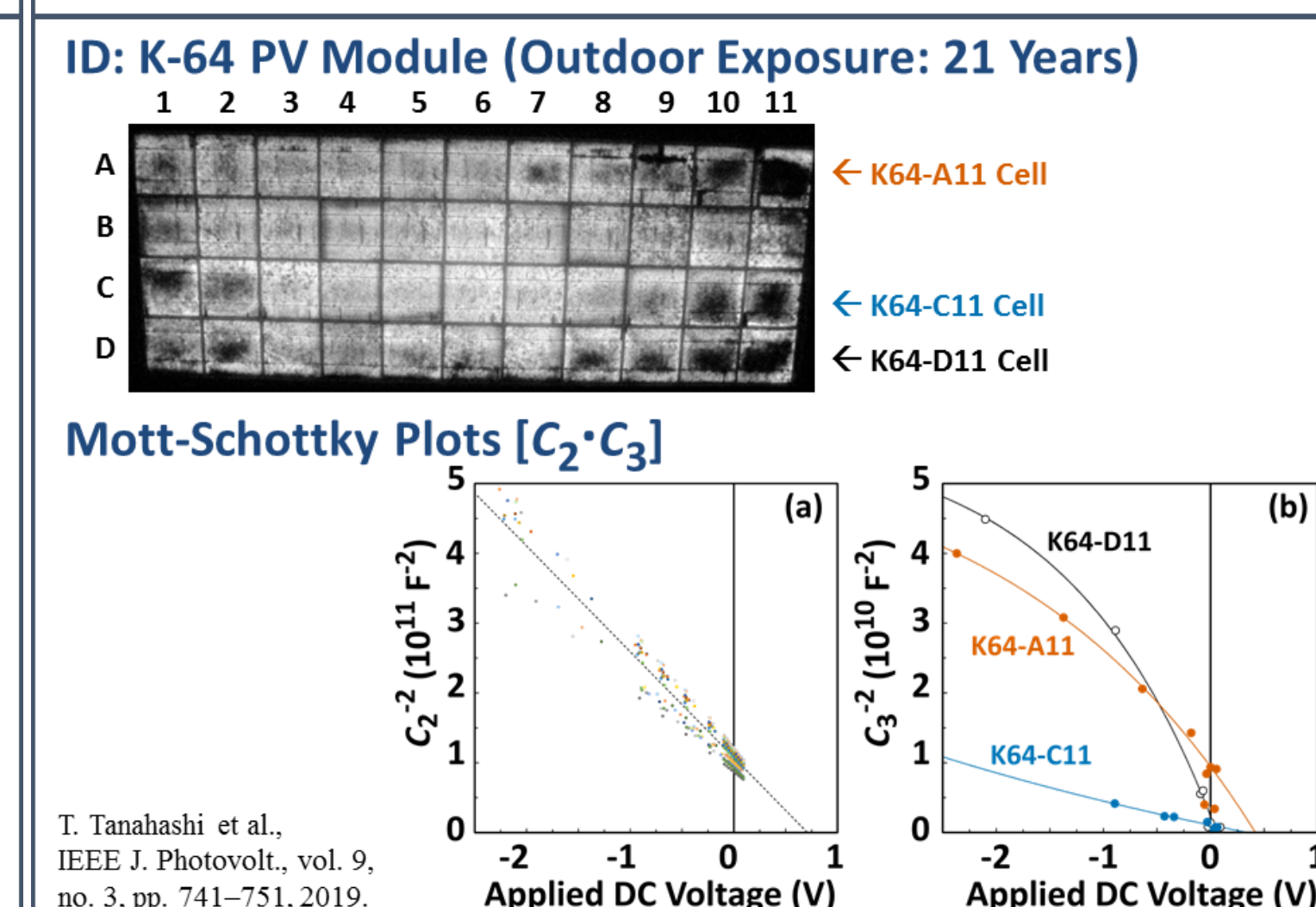
Damp-Heat Stress Test



Evaluation: AC Impedance Spectroscopy



in the Fielded PV Modules

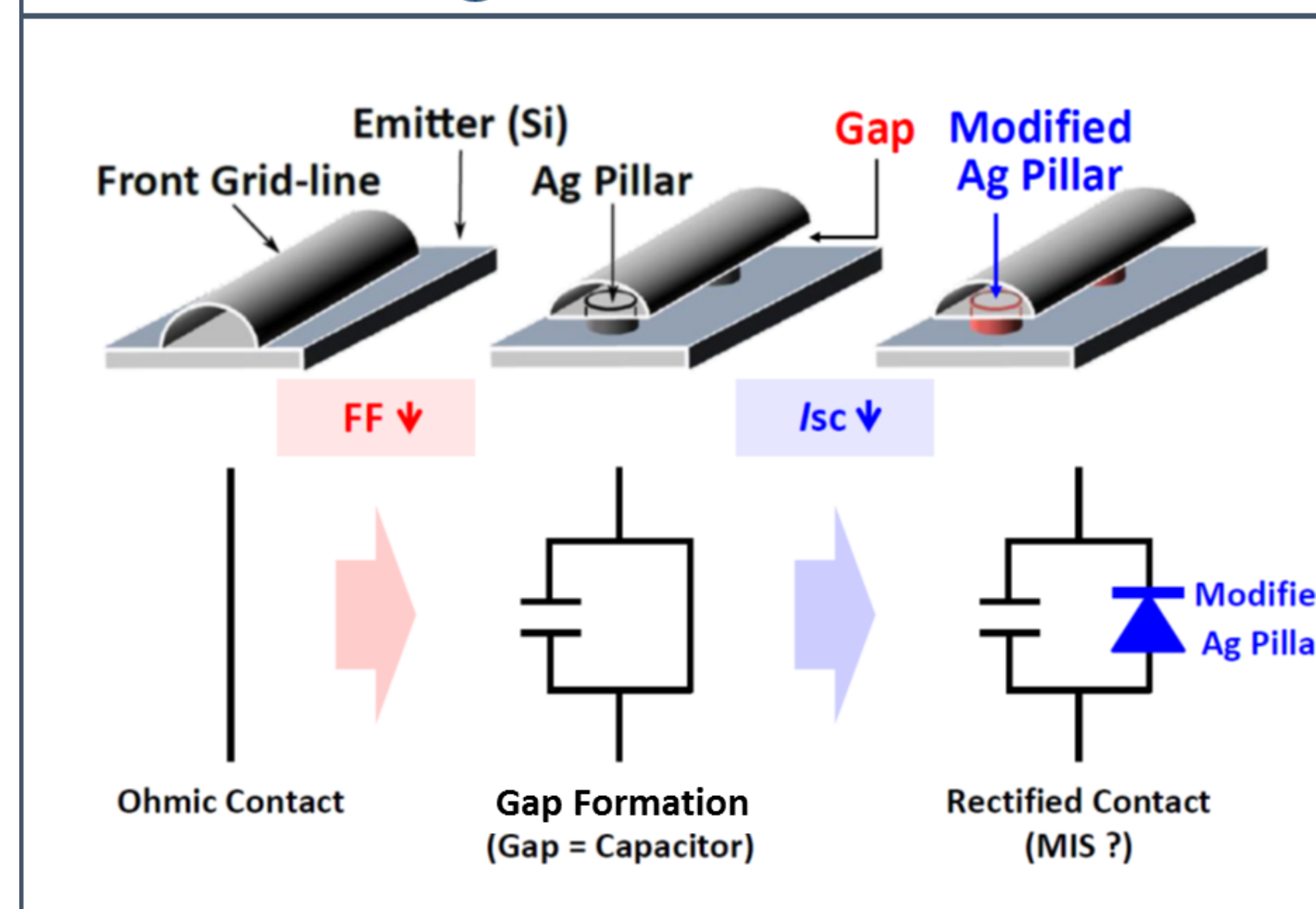


Summary

In this study, we aimed to identify the respective evolutions of AC-impedance characteristics in 2 types of PV modules which is comprised of PV cells with different susceptibility to corrosive stress, during long-term DH stress test. The peculiar characteristics of the newly expressed capacitance (C_3), of which is non-linearly changed in Mott-Schottky plot, were clearly detected in both PV modules with power-loss.

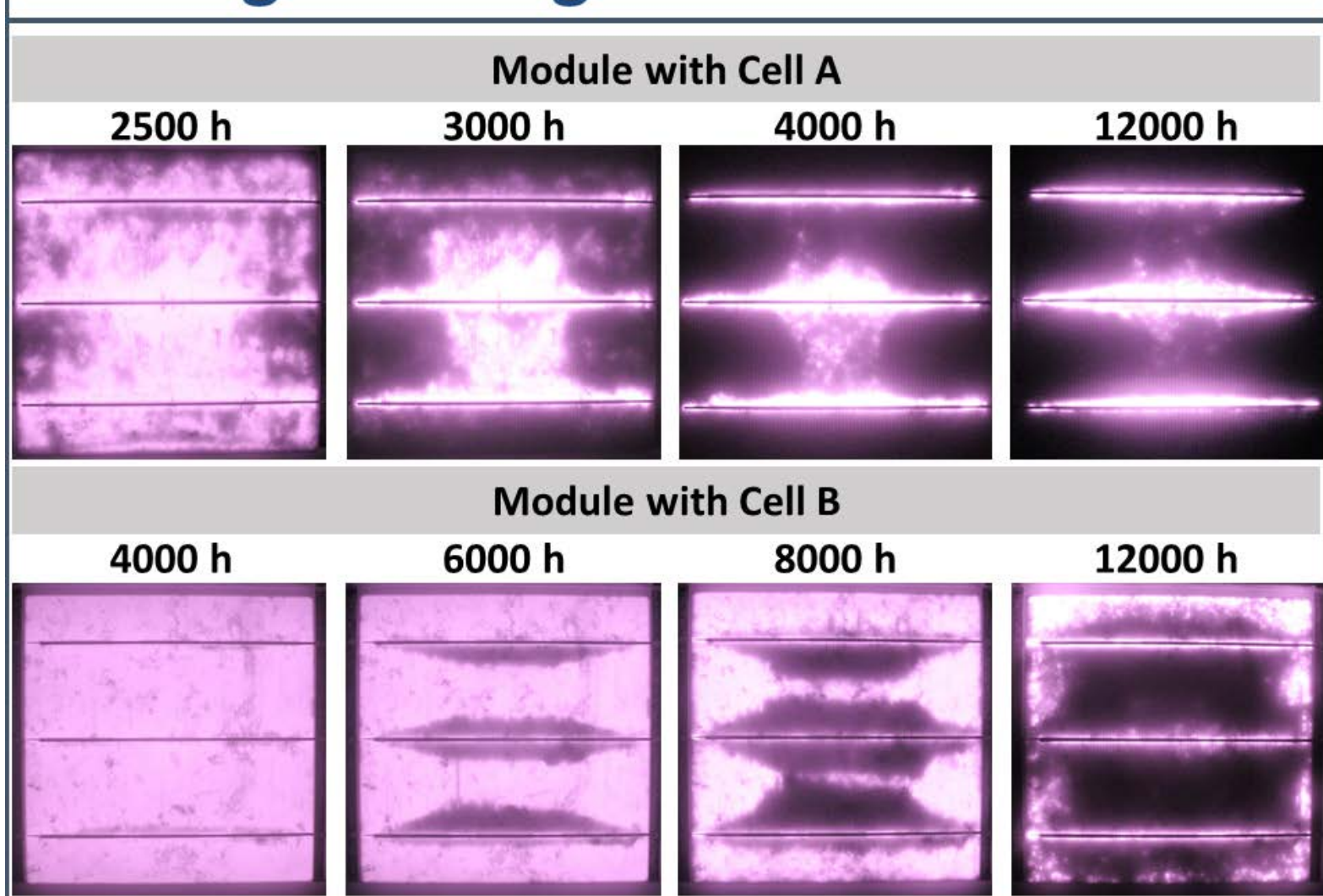
Within the parameters extracted from the fitting to a simple exponential model [$C_3^{-2} = \alpha \times \exp(-\beta \times V) + \gamma$, where α , β , and γ are fitting coefficients], α and γ were obviously correlated with the extent of power-loss. Noteworthy, these parameters from both PV modules were completely overlaid each other. These observations indicate that a common corrosion-mechanism works in both PV modules, although the kinetics of corrosion occurring in the respective PV modules is extremely different.

Common Degradation Mechanism

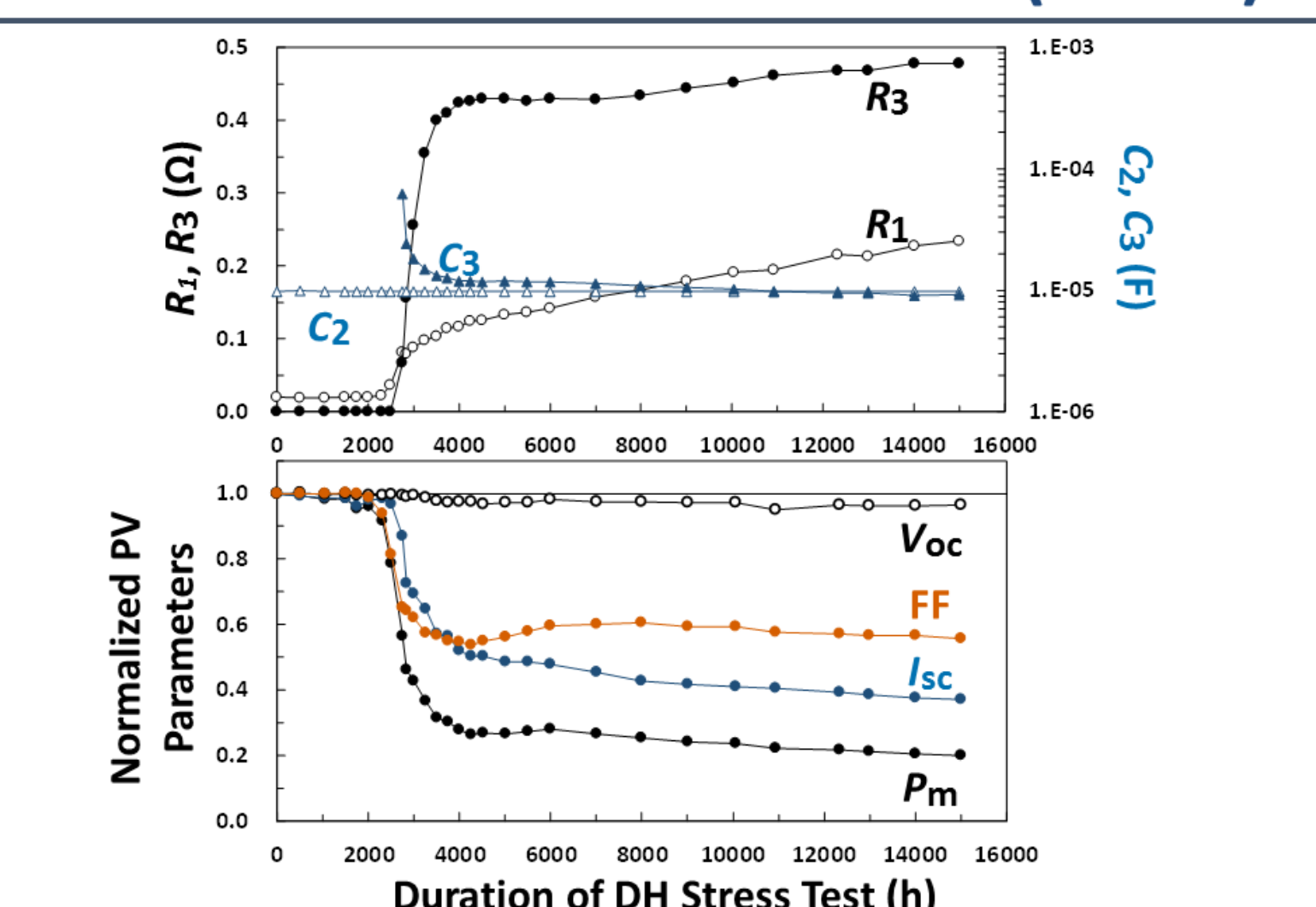


Results

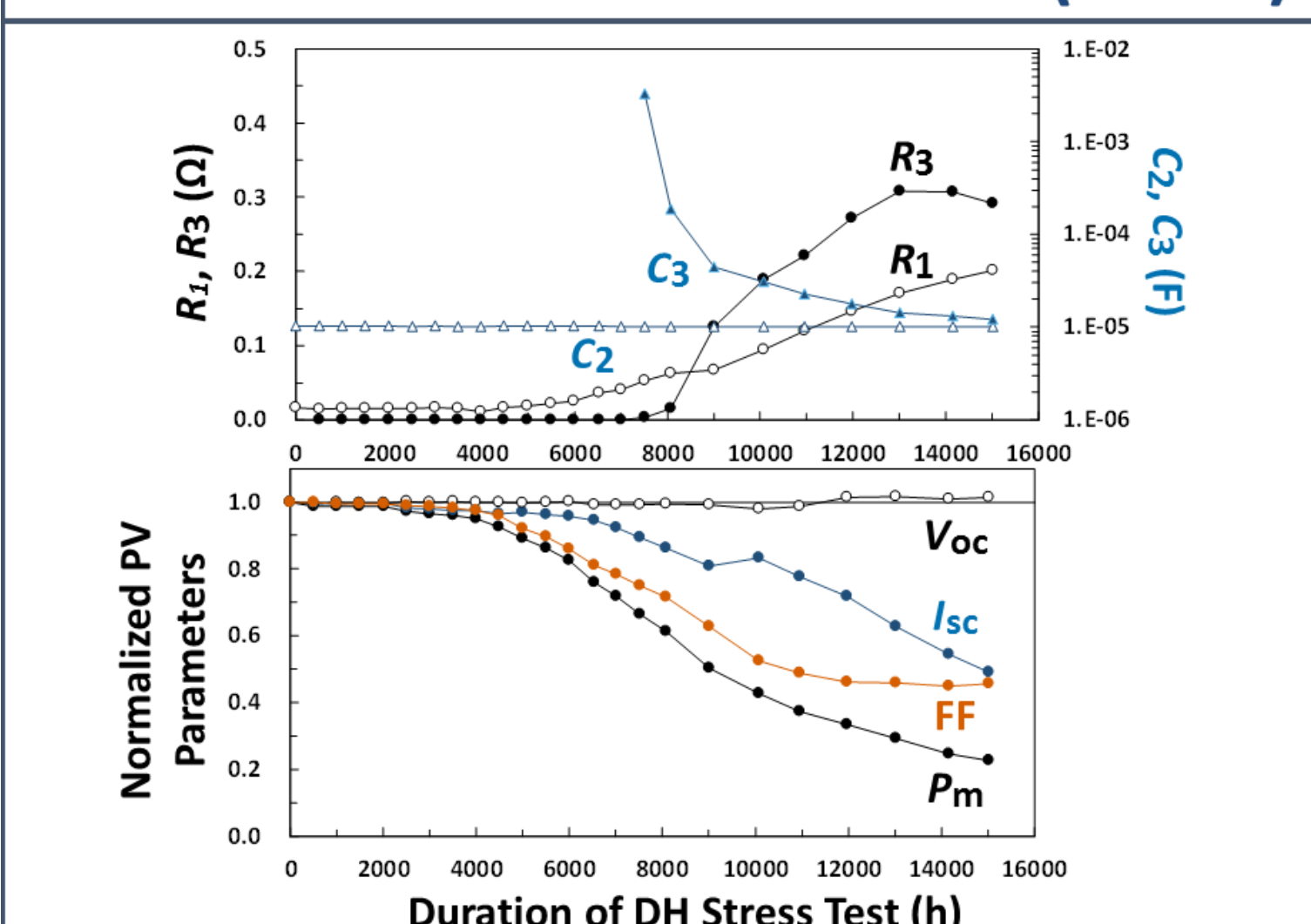
EL Images during DH Stress Test



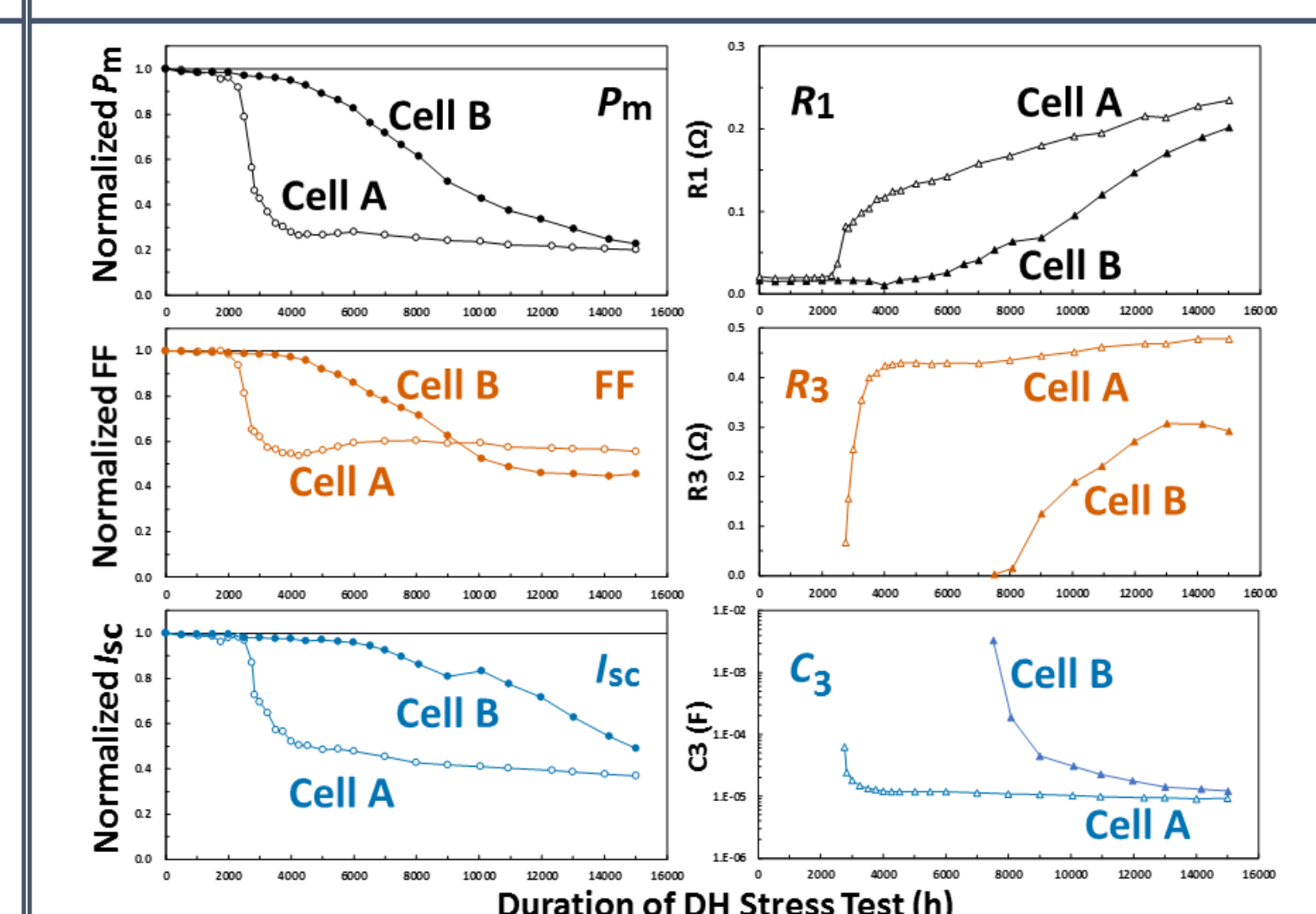
Evolution of Elec. Parameters (Cell A)



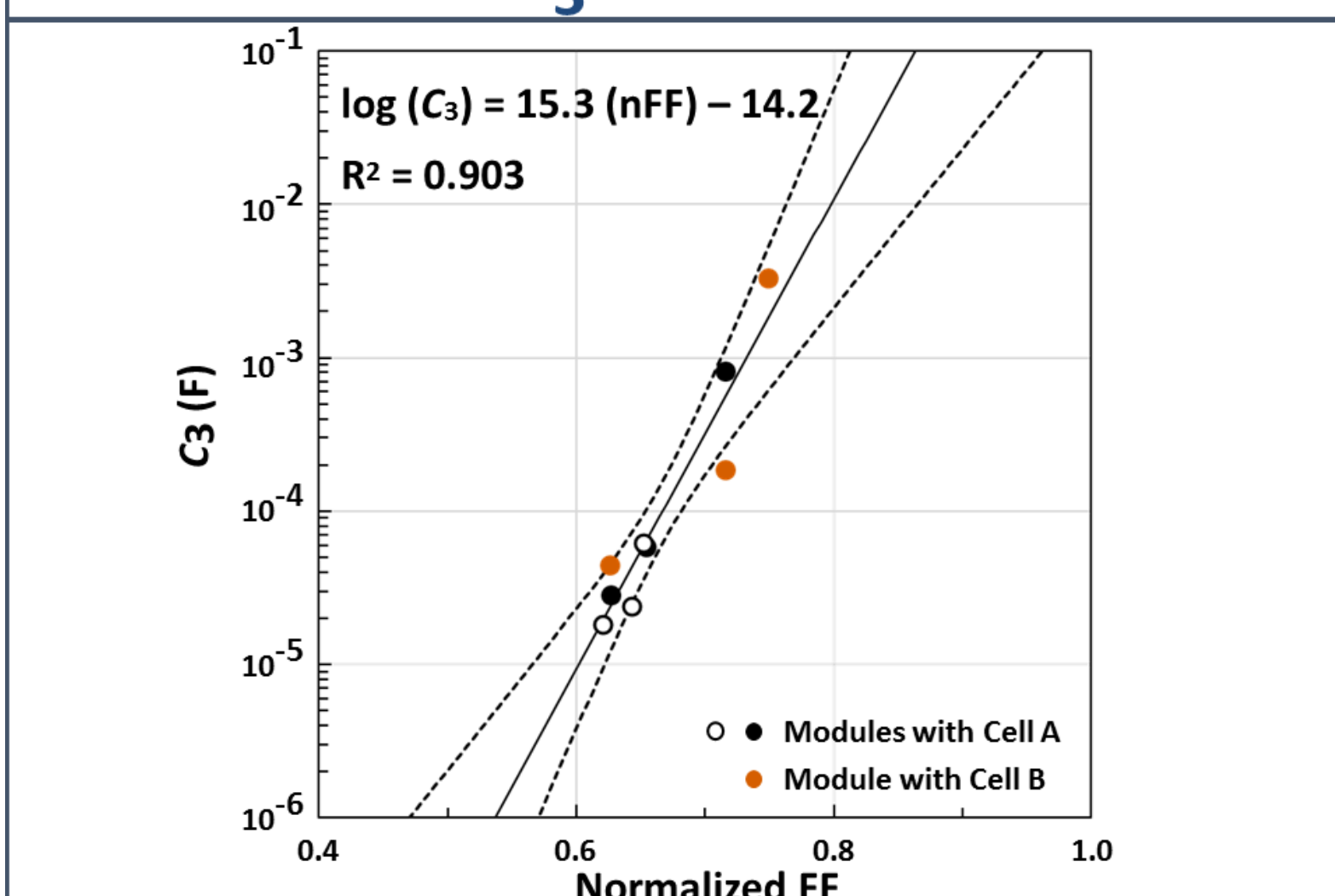
Evolution of Elec. Parameters (Cell B)



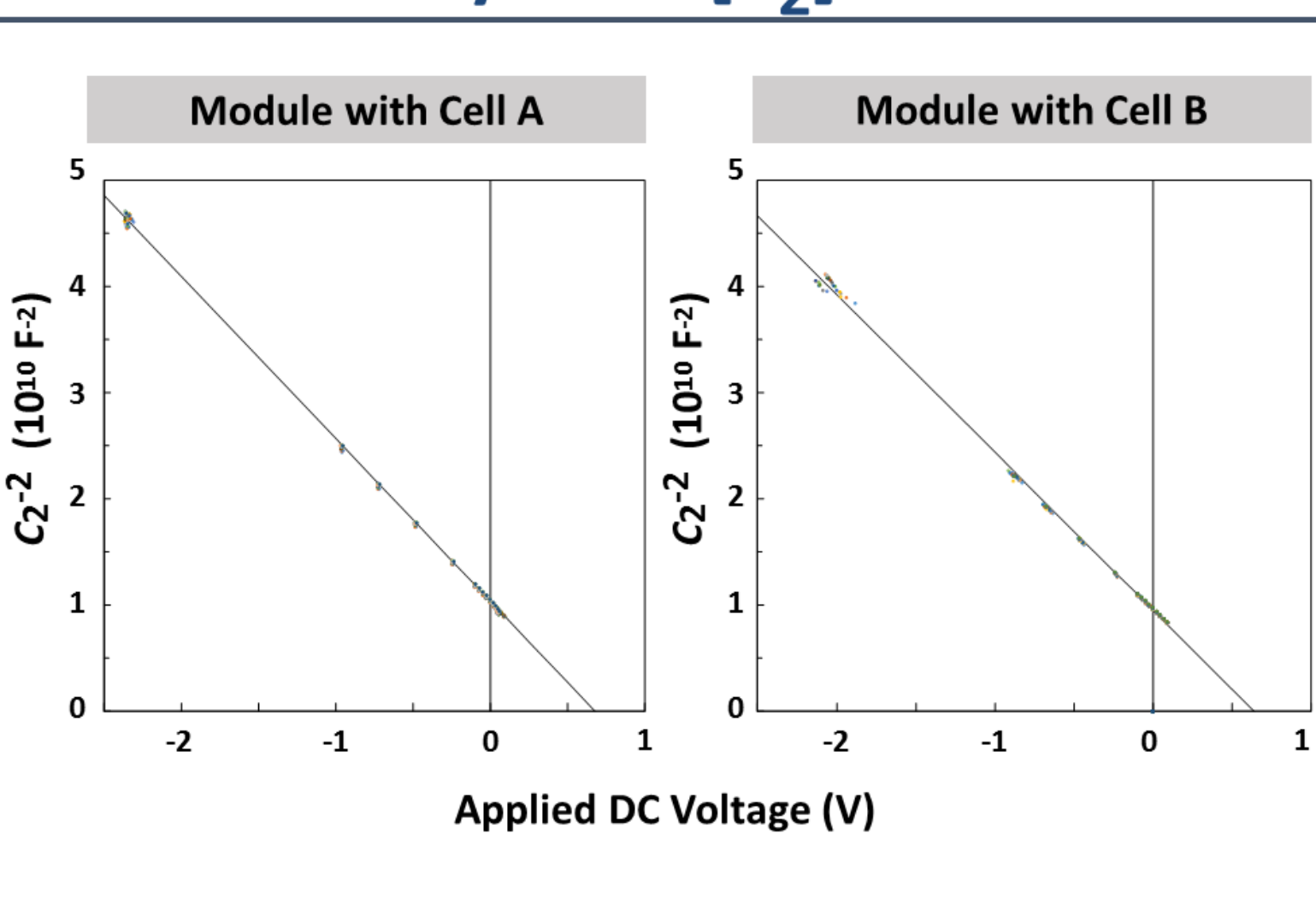
Evolution of Elec. Parameters



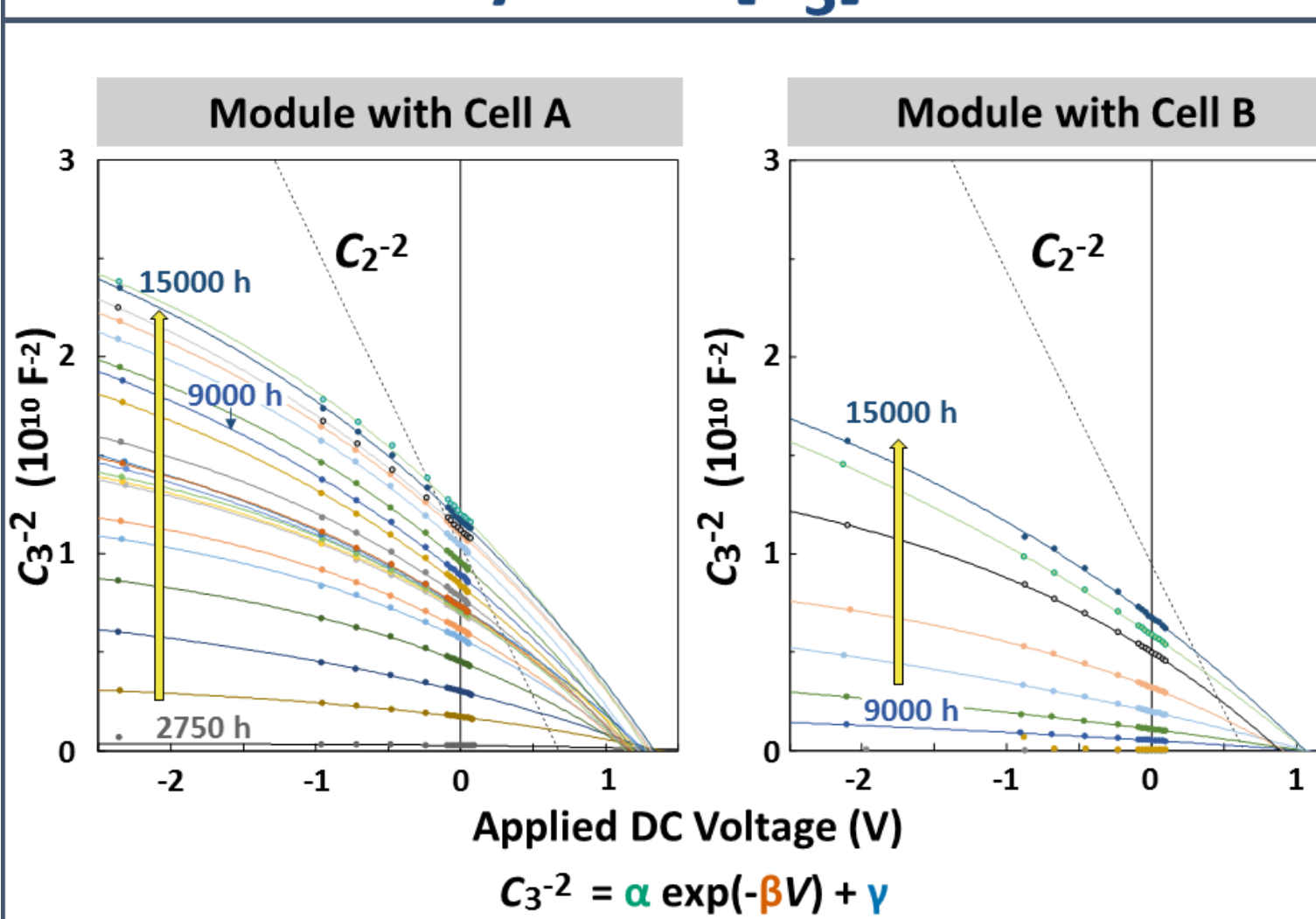
Correlation of C_3 with FF-Loss



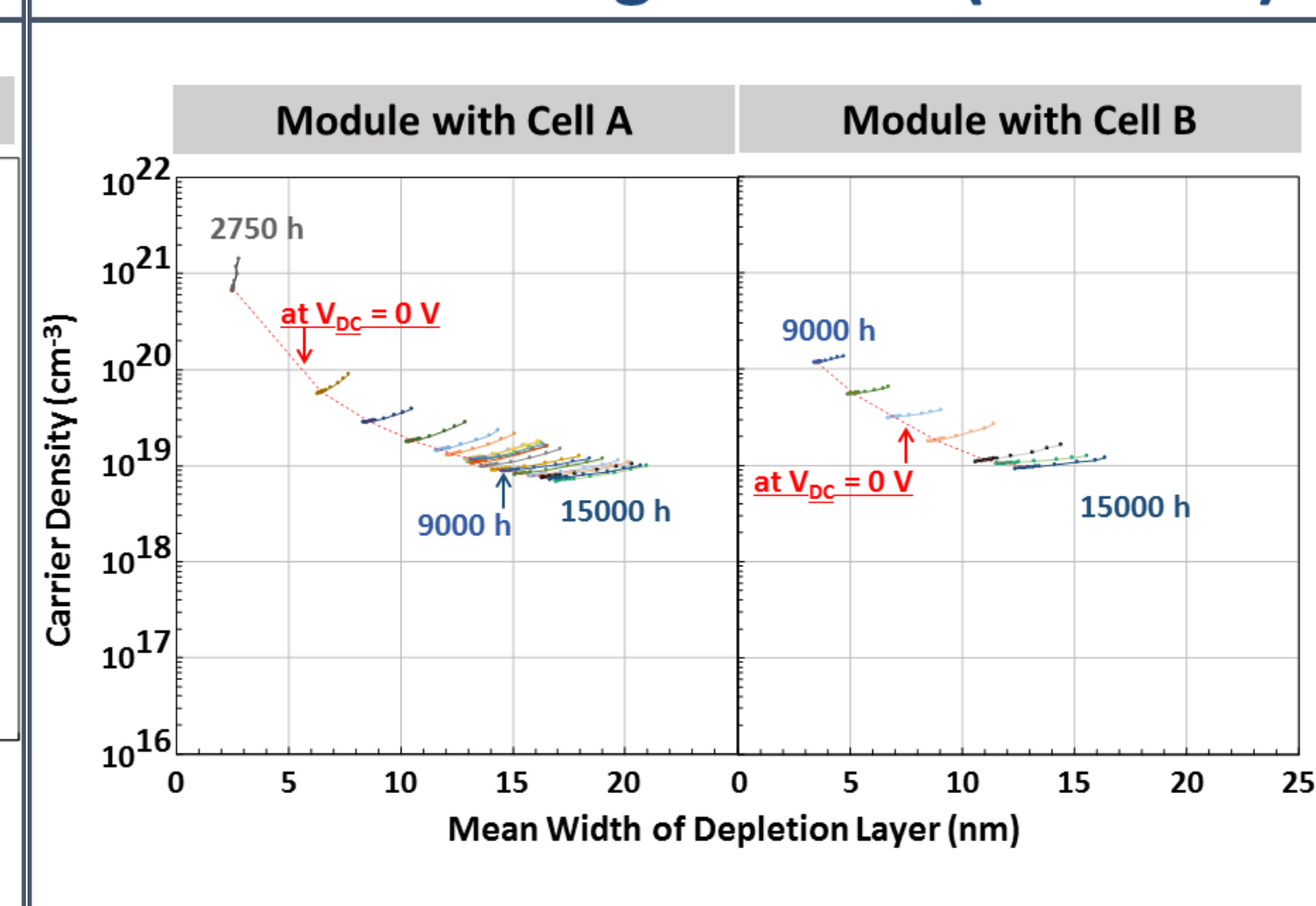
Mott-Schottky Plots [C_2]



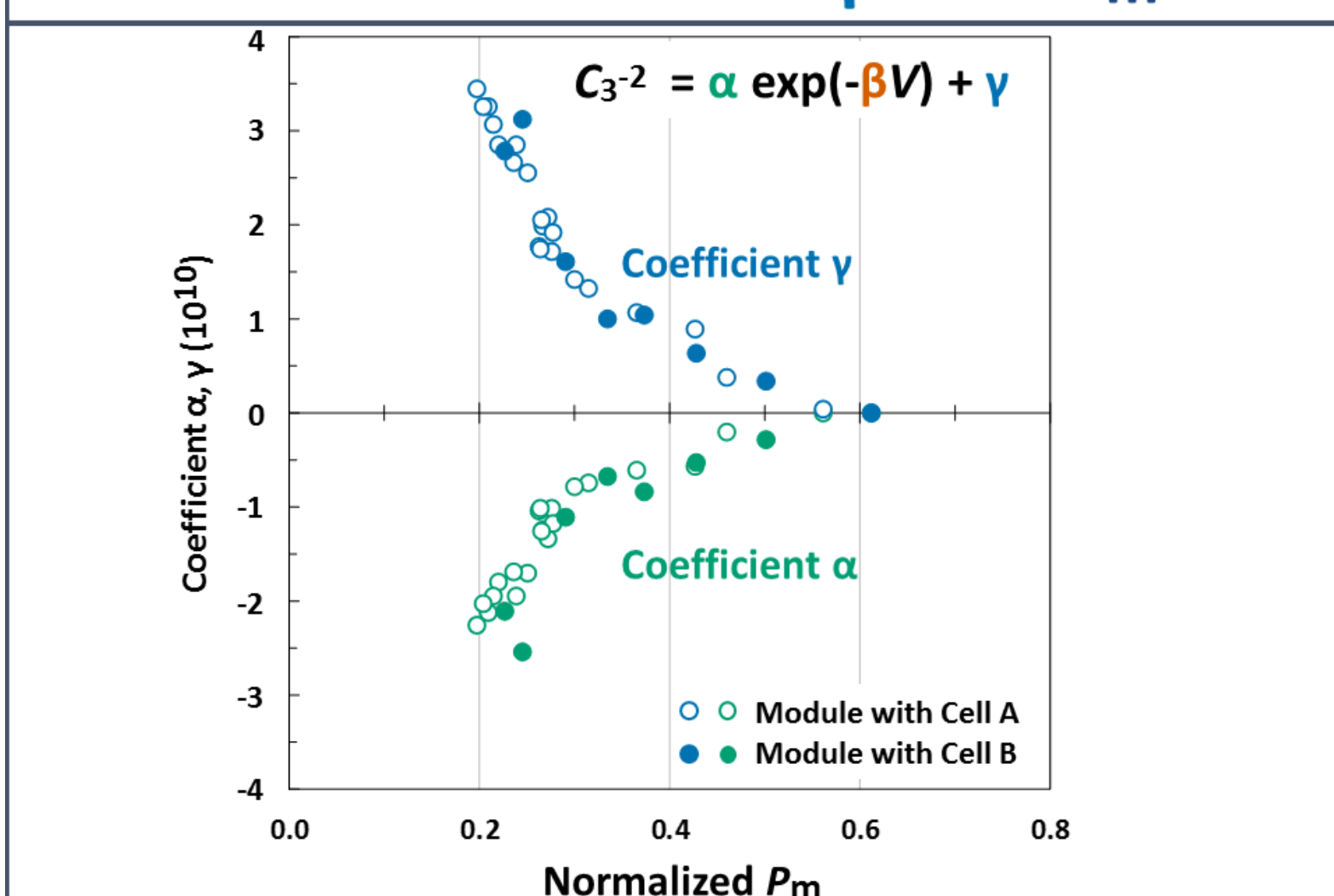
Mott-Schottky Plots [C_3]



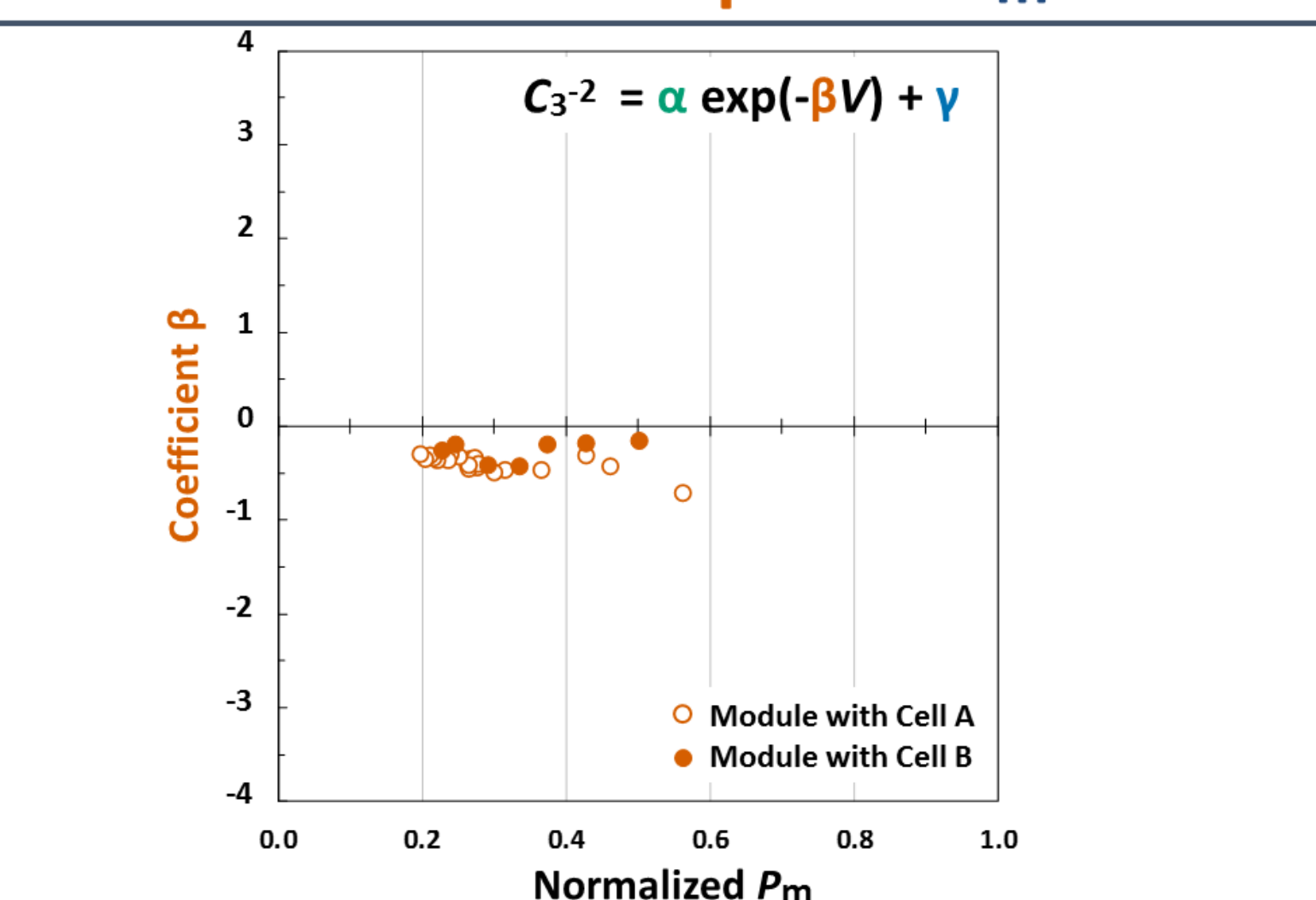
Non-Uniform Degradation (Module)



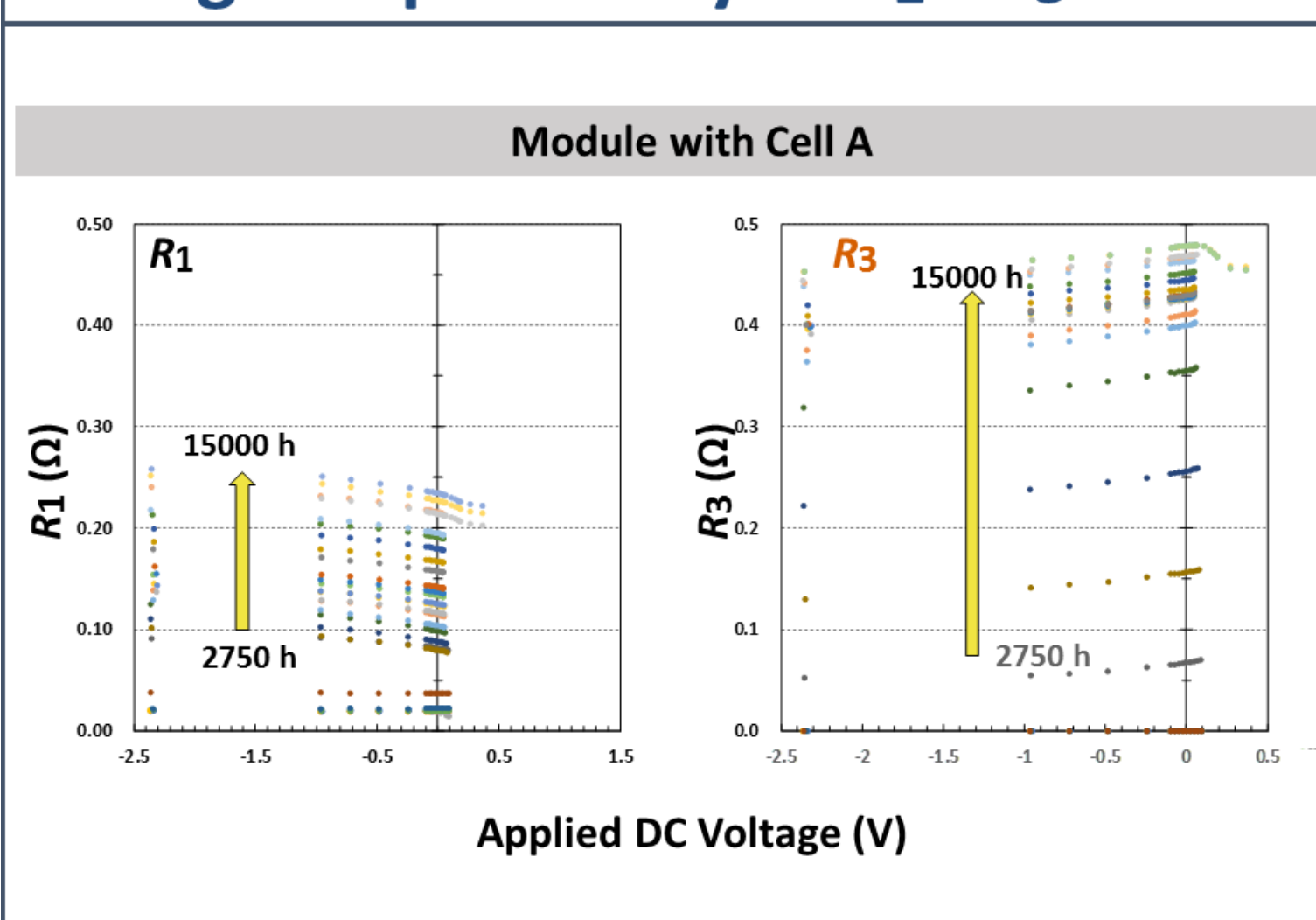
Correlation of Coeff. $\alpha \cdot \gamma$ with P_m -Loss



Correlation of Coeff. β with P_m -Loss



Voltage-Dependency in $R_1 \cdot R_3$



Voltage-Dependency in $R_1 \cdot R_3$

