

# **Statistical and Deep Learning Methods for Degradation Prediction of Polymeric Materials in PV Systems**

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## **Abstract**

Polymeric materials are widely used in photovoltaic (PV) systems. Thus, it is essential to study the service life of polymeric components in PV systems so that the service life of PV can be well understood. The failure of polymeric materials is mainly caused by photodegradation from the radiation of ultra-violet (UV). This talk aims to cover statistical and machine learning methods for the prediction of the degradation of polymeric components in photovoltaics. We first describe the study design and data collection to gather necessary data for building the statistical and machine learning methods. Then we build the predictive model based on indoor laboratory testing data. We extend the predictive model to outdoor field-testing conditions in which the environmental variables are time-varying. Deep learning methods are discussed, and the results are compared for different prediction methods.

## **Short Bio**

**Yili Hong** received his PhD in statistics (2009) from Iowa State University. He is a professor of statistics at Virginia Tech. His research interests include machine learning and engineering applications, reliability analysis, and spatial statistics. He has over 100 publications in venues such as Journal of the American Statistical Association, Annals of Applied Statistics, Technometrics, and IEEE Transactions on Reliability. He is currently an associate editor for Technometrics and Journal of Quality Technology. He is an elected member of International Statistical Institute. He won the 2011 DuPont Young Professor Award, and the 2016 Frank Wilcoxon Prize in statistics.