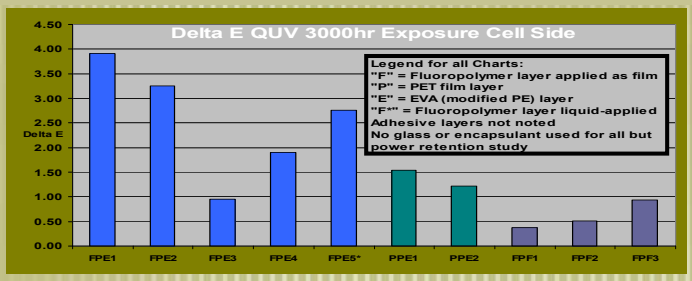
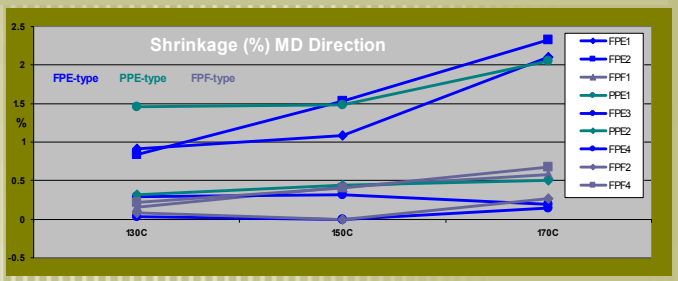
Material Considerations for Crystalline Silicon PV Module Backsheets

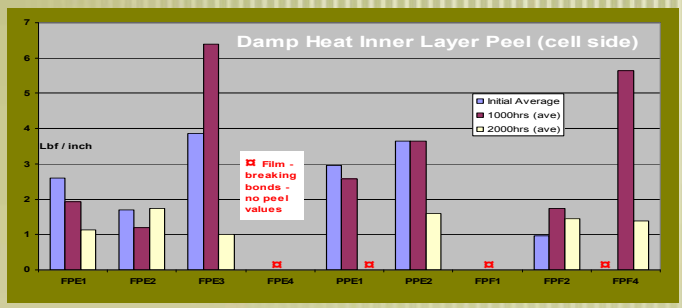
Purpose of Work: In response to market growth and drive to grid parity, PV module producers have a number of new backsheet offerings to consider for cost-effective performance and supply assurance. Many share similar generic descriptions and components. This study attempts to gain insight to any significant impact with respect to module reliability and critical performance areas such as power retention from various generic backsheet structures.

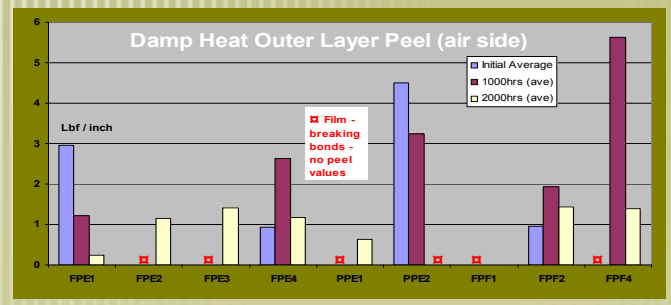




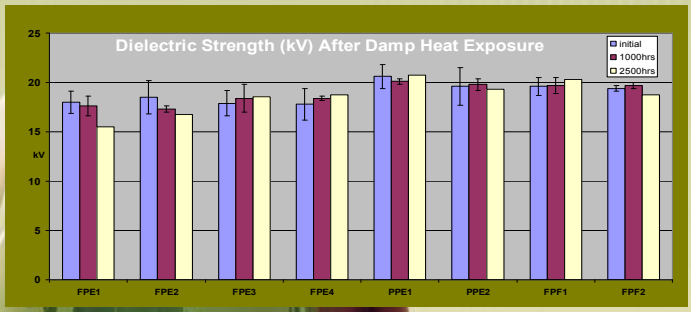
Sun-facing layers appearing more color-fast than others could maintain prolonged reflectivity and stable (1 – 2 unit ΔE) BIPV esthetics.

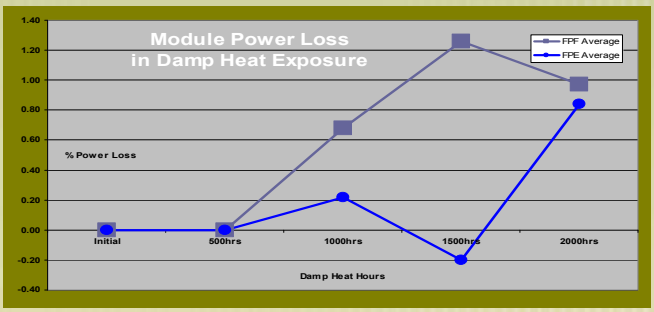
Shrinkage in excess of 1% may induce module stress and results from degree of orientation and heat stabilization of thick PET film layer(s).





Relative comparisons of backsheet long-term inter-laminar bond strengths can become much more revealing beyond 1000 hours damp heat exposure. Also, destructive bonds must be interpreted for adhesive bond strength vs. tear strength or embrittlement of film layer(s) .





Damp heat appears to have little effect on dielectric strength of various structures tested out to 2500 exposure hours.

Modules using single or double side fluoropolymer backsheet displayed good power retention after 2000 hours damp heat exposure.

Conclusion: While many of today's available backsheet offerings for c-Si modules often are described with similar constructions and components, it appears there can be considerable differences in certain properties and their retention over time. This implies that not all products with/without equivalent constructions perform equally over time and therefore may have varying degrees of impact on module reliability and power retention. Testing beyond 2000 hours and adding more structures will continue.