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Pathways and Time Scales for Water Movement to a Metal/Polymer Interface[1] HYUNGJIN LEE, University of Akron, BULENT AKGUN, Center for Neutron Research, National Institute of Standards and Technology, JIM BROWNING, Spallation Neutron Source, ORNL Neutron Science, MARK FOSTER, University of Akron — The movement of water underneath polymer films is important in the process of corrosion of metals protected by polymer coatings. Here the ingress of water to such an interface is studied with Neutron Reflectometry (NR), which allows the measurements to be done in situ. We have shown that water incursion along the interface between an epoxy hybrid coating and aluminum is fast compared to incursion through the face of the coating. With a more highly crosslinked coating, after a small amount of water has entered along the interface, water incursion slows dramatically. When the sample is once again in a dry environment, swelling of the coating caused by water is not fully reversible, but is reduced slowly over a period of a month.

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