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## Unifying mechano-sorptive creep and environmental stress cracking under the umbrella of mechano-sorptive phenomena

The molecular level mechanism underlying mechano-sorptive phenomena (MSP) is local or bulk plasticization of the polymer due to absorption or adsorption of a fluid, causing non-covalent inter-chain bonds to break resulting in the slippage of key polymer chains, which in turn leads to large recoverable or irrecoverable deformation. A distinctive feature of MSP is that the effect of the simultaneous action of mechanical stress and solvent ingress is greater than the sum of the effects of each factor in isolation. Environmental stress cracking (ESC) and Mechano-sorptive creep (MSC) are two commonly observed examples of MSP. Although they share features characteristic of MSPs, there are clear distinctions. ESC has been most often described as the failure of polymers by cracking or crazing at stresses much lower than would otherwise be necessary to cause detectable damage. The most often used parameter to describe ESC is a reduced time-to-failure for a creep test performed in the aggressive agent as compared to the same test performed in air. Less studied is the extent of deformation at failure. From a mechanical perspective, ESC when observed in creep tests, lacks the secondary and tertiary creep regions but is rather associated with brittle fracture. On the other hand, MSC shows features resembling secondary creep with recoverable deformation under sufficiently low stress magnitudes but progresses rapidly to tertiary creep and rupture when stress magnitudes are sufficiently large. Although ESC and MSC are closely related and experimental methods that have been developed to study these phenomena have strong similarities, the research on these two phenomena, both in terms of modeling and experimental characterization, have been largely isolated from each other. As a result, knowledge exchange on both modeling techniques and experimental characterization methods, which could be potentially transformative on both sides have remained unexplored. Such knowledge exchange will help improve the predictive ability of material models for MSPs, approaching a stage where MSPs can be predicted solely from fundamental physical and chemical descriptors of the polymer and fluid. This review aims to bring both ESC and MSC under one umbrella to initiate the process of knowledge exchange between them.