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**Interdiffusion and disentanglement of polymer brushes**

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In the spirit of this symposium, I will briefly survey some of the main ideas on interdiffusion and interfacial relaxation put forward by de Gennes, then consider some recent experimental developments. A very attractive feature of the central tenets of polymer physics introduced by de Gennes is their versatility in different physical situations, so that a discussion of, for example, friction, will in a natural way involve reptation. A particular case in point concerns the relaxation of interdiffused, compressed polymer brushes undergoing shear, as when they are used as lubricating layers. Here the useful concept is, unexpectedly, that of relaxation of entangled star-branched polymers, introduced by de Gennes over 30 years ago for a totally different purpose: The main idea – and conceptually a beautifully simple one - is that in order for an entangled chain emanating from a fixed branch point to relax, it needs to retract back along its 'tube' and dissipate the stress by re-equilibrating in a new configuration. Compression of two polymer brushes, whether in a good solvent or in the melt, creates a model interdiffused interface, whose dynamic properties can be analyzed based on such star-branched relaxation models, and the talk will describe some recent results on these systems.