The outstanding performance of modern elastomers is dominated by the reinforcement arising from nanometric fillers. The compounds’ peculiar thermo-mechanical properties cannot be explained without consideration of an interphase, i.e., a region of polymer with modified properties [1]. Previous results support a consensus picture of adsorbed components with locally increased Tg and gradient zone of a few nm [2]. This talk focuses on more recent results, mostly obtained by proton low-resolution NMR as a probe of the segmental dynamics, that challenge the generality of this picture. In the system poly(ethylene oxide)-silica, we do find strongly immobilized (yet intrinsically mobile) components forming a layer of up to 2 nm thickness around the particles [3], but the layer thickness is temperature-independent and is governed by a non-equilibrium process in dependence of end groups [3] and preparation conditions [4], and also of the curvature of the particles. Spin-diffusion NMR experiments, which probe the size of nanometric domains with distinct mobility, indicate that the smooth-mobility-gradient picture of the "glassy layer" must be replaced by a scenario ruled by dynamic heterogeneities associated with the increased glass transition [5].