

Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Plasticity and slow relaxation phenomena in reinforced rubbers

PAUL SOTTA, STEPHANE DUPRES, DIDIER LONG, CNRS — Elastomers reinforced with nanometric solid particles or aggregates exhibit remarkable properties: temperature dependent reinforcement of the modulus in the linear regime, non linear effects, irreversibility and hysteretic effects. Important progress has been achieved recently in modeling these properties, based on glassy layers around filler particles. In some cases, reinforcement as a function of temperature and filler volume fraction was explained quantitatively. We shall focus here on the plasticity and related slow relaxation phenomena which occur in these systems. We show that the amplitude of plasticity is correlated to the reinforcement amplitude, and that plasticity relaxes with a very broad distribution of relaxation times (similar to an ageing phenomenon), in the same way as the stress relaxes at high strain amplitude. These experimental observations of long time evolution are well described by the mesoscale model for reinforced rubbers that we have proposed.

Paul Sotta
CNRS

Date submitted: 29 Dec 2010

Electronic form version 1.4