Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Neutron reflectivity as a tool to study the interdigitation of grafted polymer chains and its dynamics. LILIANE LEGER, FRDRIC RESTAGNO, Laboratoire de Physique des Solides, CNRS, Univ. Paris-Sud, Universit Paris-Saclay, 91405 Orsay Cedex, France, FABRICE COUSIN, FRANOIS BOUE, Laboratoire Lon-Brillouin, CEA, CNRS, 91191 Gif-sur-Yvette CEDEX FRANCE, ALEXIS CHENNEVIERE, Laboratoire de Physique des Solides, CNRS, Univ. Paris-Sud, Universit Paris-Saclay, 91405 Orsay Cedex, France — Three series of experiments aimed at characterizing the interdigitation between a brush and a melt, and based on neutron reflectivity, are presented and discussed. The density profile of brush chains has been analysed for series of annealing times, on h-PS brushes in contact with d-PS melts, as a function of molecular weights and grafting densities. We show that the relaxation dynamics of the brush chains can be modelled taking into account the long relaxation time of end tethered chains along with the reptation of the melt chains which accelerates the arm retraction process. Using a non-grafted layer with a thickness smaller than the equilibrium size of the brush when immersed into a thick melt allows one to apply chosen degrees of confinement to the brush. We show that the interdigitation dynamics is affected by such confinements, in a way reminiscent of the change of the glass transition temperature in nanometric PS films. Finally, when the upper d-PS layer is sheared above T_g, flow with large slip at the wall has been observed and interpreted in terms of stretching and expulsion of the grafted chains from the melt. We show how neutron reflectivity directly evidence this expulsion.

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Date submitted: 06 Nov 2015 Electronic form version 1.4