Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Structure and dynamics of dense polymer chains in 2D HENDRIK MEYER, CNRS Institut Ch. Sadron, JOACHIM P WITTMER, ALBERT JOHNER, JORG BASCHNAGEL — Self-avoiding polymers in two-dimensional melts are known to adopt compact and segregated configurations. Compactness does obviously not imply Gaussian chain statistics nor does segregation of chains impose disk-like shapes minimizing the average perimeter length of the chains. Using scaling arguments and molecular dynamics simulations with chain length up to 2048 we show that the chain perimeters are highly irregular and characterized by a fractal line dimension 5/4. This result may be verified experimentally from the power-law scaling of the intrachain form factor in the intermediate wavevector regime in agreement with a generalized Porod law for a compact object of fractal border [1]. The dynamics of dense polymer chains exhibits two interesting features: the incompressibility induces long range correlations in the displacement auto-correlations and a relaxation channel due to friction at the fractal contours of compact sub-segments leads to relaxation faster than a Rouse model would predict [2].

[1] H. Meyer et al Phys. Rev. E 79 050802(R) (2009); J. Chem. Phys. (2010)
[2] J. Wittmer et al. Phys. Rev. Lett 105 (2010) 037802.

Hendrik Meyer
CNRS Institut Ch. Sadron

Date submitted: 27 Dec 2010 Electronic form version 1.4