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Thermodynamic control of star polymer architecture.[1] DURGESH K. RAI, Massachusetts Institute of Technology, GREGORY BEAUCAGE, University of Cincinnati, KEDAR RATKANTHWAR, King Abdullah University of Science and Technology, PETER A. BEAUCAGE, Cornell University, RAMNATH RAMACHANDRAN, Procter Gamble, NIKOS HADJICHRISTIDIS, King Abdullah University of Science and Technology — Star polymers differ from linear chains due to steric interactions between the arms. These steric interactions have not been previously quantified. This presentation will report on the extent that star arms are straightened under variable temperature and solvent as well as star functionality. The second virial coefficient is directly measured for the stars. The topological consequences of variable solvation are quantified using dilute solution neutron scattering and a hybrid unified scattering function coupled with the RPA equation. The results contradict the predictions of the Daoud-Cotton model and reflect a new uniform fractal model for star polymers at low functionality below about 8 arms. A transition to Daoud-Cotton behavior might be anticipated for high functionality stars and dendrimers.

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