Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Macroscopic structure and properties of aqueous methylcellulose gels TIRTHA CHATTERJEE, ROLAND ADDEN, MEINOLF BRACKHAGEN, ALAN I. NAKATANI, DAVID REDWINE, ROBERT L. SAMMLER, The Dow Chemical Company, DPCE TEAM — Cold semi-dilute aqueous methylcellulose (MC) solutions are known to undergo thermoreversible gelation when warmed. Here, studies on two MC materials, which contrast in thermal gelation performance (gel temperature, hot gel modulus etc.) even though they were prepared with similar methyl ether substitution levels and molecular weight distributions are presented. Small-angle neutron scattering (SANS)* measurements reveal differences in their gel structures which presumably are relevant to their thermal gelation performances. MC gel with higher gel temperature and lower hot gel modulus contains a single temperature invariant characteristic length ($\sim$ 1000 Å). However, besides this length scale, an additional and distinct smaller structure is also observed for the material with the lower gel temperature and the higher hot gel modulus. Further, in this case, the characteristic length scale decreases as temperature rises where as, the other length scale (smaller in size) remain almost temperature-invariant. The smaller domain size of the gel structure leads to the higher hot gel modulus for these methylcellulose materials. *Performed at NG3 beamline, NCNR, NIST.

Tirtha Chatterjee
The Dow Chemical Company

Date submitted: 24 Nov 2010 Electronic form version 1.4