Abstract Submitted
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Quantification of the Molecular Topology for Hierarchical Macromolecules GREGORY BEAUCAGE, Univeristy of Cincinnati — Hierarchical structures are often produced from ramified macromolecules such as comb, star, hyperbranched and dendritic polymers. We have recently derived a method for the description of complex molecular and nanostructural topologies based on a statistical analysis [1,2]. The method has been applied to a wide range of hierarchical materials from long chain branched polyolefins, hyperbranched polymers [3], star polymers, H-branched polymers to cyclics, biopolymers [4], and branched nanostructured aggregates. This method, when applied to neutron scattering data, yields the mole fraction of a structure involved in branching, the number of branch sites, the average branch length, and the number if inner chain segments. Further, quantitative measures of the convolution or tortuosity of the structure and the connectivity of the branching network can be made, opening a new window for our understanding of complex molecular topologies. This understanding has recently been applied to biological chain molecules to understand protein and RNA folding [4] for example as well as to aggregated, nanostructured, carbon soot.
[1] Beaucage, G, *Phys. Rev. E* **2004**, 70, 031401. [2] Kulkarni, AS & Beaucage, G, *J. Polym. Sci. Part B: Polym. Phys.* **2006**, 44, 1395. [3] Kulkarni, AS & Beaucage, G, *Macromol. Rapid Comm.* **2007**, 28, 1312.?4) Beaucage, G, *Biophysical J.* **2008**, 95, 503.

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