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Complexity from Specificity: Light Scattering and Colloidal Studies of Dscam Self-Association JESSE COLLINS, Harvard School of Engineering and Applied Science (SEAS), NATALIE ARKUS, Harvard SEAS, GUANG-NAN MENG, Harvard Physics, MICHAEL BRENNER, Harvard SEAS, DIETMAR SCHMUCKER, Dana Farber Cancer Institute, VINOTHAN MANOHARAN, Harvard SEAS and Department of Physics — The self-assembly of complex structures from nanometer-sized building blocks is of great technological importance(i.e. for the development of tissue scaffolds and photonic crystals) and is of significant basic scientific interest. Here I present light scattering and colloidal aggregation studies of Dscam, a protein with over 18,000 splice variants which all (or almost all) exhibit exclusively homophilic binding, and which is necessary for the generation of structural complexity in the brain of insects. Static and dynamic light scattering data reveal the statistical mechanical properties of Dscam self-association, including the free energy, second virial coefficient, and oligomer molecular weight. Finally, I demonstrate how to exploit Dscam's unprecedented level of molecular diversity and specificity for the self-assembly of custom nano- and micro-structures out of Dscam-conjugated colloids.

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