

# Cyclic Polymers Form Dynamic Clusters in Solution Due to A Delicate Balance of Secondary Interactions

## Scientific Achievement

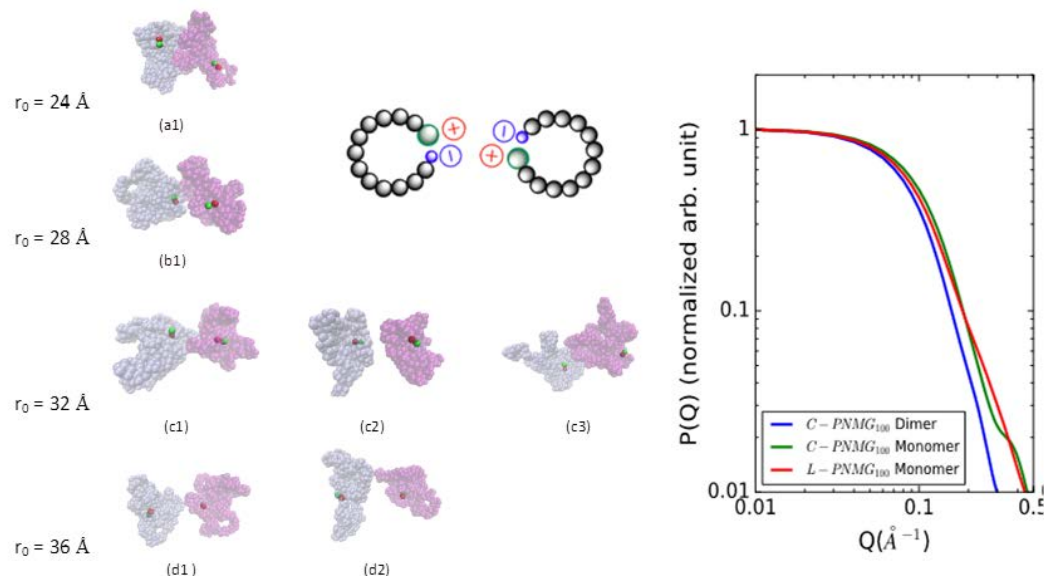
It was revealed that secondary interactions encoded in the molecular architecture (i.e., cyclic versus linear) can confer control over the formation of dynamic intermolecular assemblies.

## Significance and Impact

Dynamic aggregation of polymers can result from a competition between forces that favor aggregation (e.g., dipole-dipole interactions and solvophobic effects) and those that oppose it (e.g., the need for the dipoles/charged ends to be solvated). These fundamental studies are relevant to understand and optimize self-assembly of soft-matter systems as well as utilize these biomimetics.

## Research Details

- Cyclic polypeptoids bearing oppositely charged chain ends form small dynamic clusters in dilute alcohol solution
- The cluster formation is driven by complex interplay of various secondary interactions (dipole-dipole interaction, solvophobic effect, solvation of dipole)
- Linear polymer analogs, in the absence of the corresponding dipole-dipole attraction, failed to form clusters



Du, P.; Li, A.; Li, X.; Zhang, Y.; Do, C.; He, L.; Rick, S., John, V. J.; Kumar, R.\* and Zhang, D.\* MD simulation snapshots showing the cluster formation of cyclic polypeptoids and the relevant simulated SANS profiles  
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