### Supplemental Table 1 Summary of the SAXS data acquisition and analysis.

#### A) SAXS data collection parameters

| Parameter | Value |
|-----------|-------|
| Instrument | Bruker Nanostar at NMRFAM, University of Wisconsin-Madison |
| Wavelength (Å) | 1.5418 |
| Beam geometry | 2 pinholes (500 µm) |
| Sample-to-Detector length (m) | 1 |
| Detector | VANTEC-2000 (2048X2048 pixel) |
| qmax measurement range (Å⁻¹) | 0.019-0.25 |
| Absolute scaling method | Comparison with scattering from buffer |
| Normalization | To transmitted intensity by beam stop counter |
| Monitoring for radiation damage | Data frame by frame comparison |
| Exposure time | 3600s ± 4 |
| Sample temperature (°C) | 25 |

#### C) Software employed for SAXS data reduction, analysis and interpretation

| Software | Description |
|----------|-------------|
| SANS (Bruker) | Primary data reduction |
| ProfParam (Wilkins et al., 1999) | Extinction coefficient estimate |
| PRIMUS from ATSAS 2.8.1 (Pevlovich et al., 2012) | Basic analyses: Guinier, P(r) |
| DAMMIF (Franke and Svergun, 2009) | Shape-based modeling |
| CRYSSOL from PRIMUS in ATSAS 2.8.1 (Svergun et al., 1995) | Atomic structure modelling |
| DAMAVER (Volkov and Svergun, 2003) | Validation and averaging |
| SUPCOMB (Koer and Svergun, 2001) | Structure superimposition |
| PyMOL | 3D graphic model representations |

#### D) Structural Parameters

| Parameter | SpCL | SpCL + Mg²⁺ |
|-----------|------|-------------|
| Guinier analysis | | |
| R₀ (Å) | 718 ± 4 | 1256 ± 3 |
| qmax (Å⁻¹) | 0.019 | 0.019 |
| qR₀ max | 1.17 | 1.25 |
| P(r) analysis | | |
| R₁ (Å) | 762 ± 4 | 1305 ± 5 |
| D₀ (Å) | 26.8 ± 0.2 | 22.3 ± 0.4 |
| qmax (Å⁻¹) | 85 ± 3 | 70 ± 2 |
| qrange (Å⁻¹) | 0.019-0.22 | 0.019-0.22 |
| MW calculated by Vₑ | 37 ± 4 | 35 ± 4 |
| Porod Volume (Å³) | 61435 | 44441 |

#### E) Shape model fitting results

| Parameter | SpCL | SpCL + Mg²⁺ |
|-----------|------|-------------|
| qrange for fitting (Å⁻¹) | 0.019-0.20 | 0.019-0.20 |
| Symmetry | P1 | P1 |
| Annealing procedure | Slow | Slow |
| Normalized spatial discrepancy (NSD) | 0.755 (0.051) | 0.658 (0.047) |

#### F) Atomistic Modelling

| Parameter | SpCL | SpCL + Mg²⁺ |
|-----------|------|-------------|
| qrange for all modelling | 0.019-0.22 | 0.020-0.21 |
| CRYSSOL⁷ | | |
| q² | 2.13 | 2.16 |
| Predicted R₁ (Å) | 25.7 | 22.3 |
| Vol | 20788 | 20788 |
| Rs | 1.6 | 1.5 |
| Dro | 0.048 | 0.025 |

¹ In CRYSSOL, the adjustable parameters are excluded volume (Vol in Å³), optimal atomic radius (Rs in Å) and Dro (optimal contrast of the hydration shell ε Å³)