Supporting Information

Cromoglycate Mesogen Forms Isodesmic Assembly Promoted by Peptides and Induces Aggregation of a Range of Proteins

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Figure S1 Images of 5’DSCG solutions at different concentrations in (I) Millipore water (II) Luria Bertani (LB) media (1 wt% sodium chloride, 1 wt% tryptone and 0.5 wt% yeast extract) viewed under cross polars.
Figure S2 $^1$H NMR spectra of 5 wt% 5’DSCG (A), 4 wt% 5’DSCG (B), 2 wt% 5’DSCG without (C) and with LB components (D) in D$_2$O. The protons of 5’DSCG and peak assignments are labelled in red.
**Figure S3** NOESY spectra of 2 wt% 5’DSCG with LB components (1 wt% sodium chloride, 1 wt% tryptone and 0.5 wt% yeast extract).
Figure S4 NOESY spectra of 2 wt% 5’DSCG with (A) and without (B) LB components in D₂O. Same phase (with respect to the diagonal) NOE cross-peaks in black and opposite phase (with respect to the diagonal) NOE cross-peaks in red. The protons of 5’DSCG and peak assignments are labelled in red.

Figure S5 Plot of intensity of NOE cross peaks vs. temperature for 2 wt% 5’DSCG with LB components.
Figure S6 Optical density (OD$_{600}$) measurements of solutions containing 7 wt% 5’DSCG mixed with individual LB media components: yeast extract, tryptone and sodium chloride at different concentrations. (7 wt% 5’DSCG with yeast extract at concentration higher than 2.5 wt% caused precipitation).
Figure S7 Optical density ($OD_{600}$) measurements of solutions containing additives: 4.6 wt% NaCl, 1 wt% casamino acids, 31.5 wt% urea, 8.53 wt% L-glutamic acid, 2.35 wt% L-alanine and 2.94 wt% L-arginine mixed with different concentrations of 5’DSCG.
Figure S8 Optical density (OD\textsubscript{600}) measurements of solutions containing 3 wt\% 5’DSCG mixed with different concentrations of non-ionic polymers: poly-vinylalcohol (PVA, mw ~ 9,000-10,000), poly-vinylpyrrolidone (PVP, mw ~40,000), and poly-acrylamide (PAAm, mw ~ 9,000-10,000)

Table S1 Pili protein precipitation with NaCl and 5’DSCG as precipitants.

<table>
<thead>
<tr>
<th>Reservoir Solution</th>
<th>2.8 wt% NaCl</th>
<th>0.25 wt% 5’DSCG</th>
<th>0.5 wt% 5’DSCG</th>
<th>1 wt% 5’DSCG</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 mg/mL powder</td>
<td>no precipitate</td>
<td>with precipitate\textsuperscript{1}</td>
<td>with precipitate\textsuperscript{2}</td>
<td>no precipitate</td>
</tr>
<tr>
<td>10 mg/mL powder</td>
<td>no precipitate</td>
<td>with precipitate\textsuperscript{1}</td>
<td>with precipitate\textsuperscript{2}</td>
<td>no precipitate</td>
</tr>
<tr>
<td>20 mg/mL powder</td>
<td>no precipitate</td>
<td>with precipitate\textsuperscript{1}</td>
<td>with precipitate\textsuperscript{2}</td>
<td>no precipitate</td>
</tr>
</tbody>
</table>

\textsuperscript{1}Precipitate observed after 3 days \textsuperscript{2}and 5 days
Figure S9 Different protein aggregates induced by 5’DSCG in hanging droplets. The droplets (5 μL) contained (A) 0.625 wt% 5’DSCG and 25 mg/mL pilin, (B) 0.625 wt% 5’DSCG and 1 mg/mL lectin A, (C) 0.625 wt% 5’DSCG and 20.5 mg/mL esterase, (D) 0.625 wt% 5’DSCG and 20.5 mg/mL bovine serum albumin, and (E) 0.14 wt% 5’DSCG + 37.5 mg/mL lipase. The reservoir solution contained 350 μL of (A, B, C, D) 1.25 wt% 5’DSCG, and (E) 0.28 wt% 5’DSCG. Hanging drops kept at ambient temperature were observed over 5-15 days. All solutions were prepared using 25 mM Tris buffer, pH = 7.5; except for (D) where pH = 6.5. Scale bar = 380μm

Table S2 Mass and isoelectric point (pI) of proteins used in 5’DSCG aggregation.

<table>
<thead>
<tr>
<th>Protein</th>
<th>pilin</th>
<th>truncated pilin</th>
<th>lectin A</th>
<th>esterase</th>
<th>lipase</th>
<th>bovine serum albumin</th>
<th>trypsin</th>
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</thead>
<tbody>
<tr>
<td>Mass (kDa)</td>
<td>15.5</td>
<td>12.2a</td>
<td>12.9</td>
<td>63</td>
<td>60</td>
<td>66</td>
<td>24</td>
</tr>
<tr>
<td>Isoelectric point (pI)</td>
<td>6.59</td>
<td>7.94</td>
<td>4.88</td>
<td>5.0</td>
<td>4.8/5.8b</td>
<td>4.7</td>
<td>10.1</td>
</tr>
</tbody>
</table>

a mass and pI calculated using pI/MW tool (https://web.expasy.org)

b pI of two isoforms of lipase extracted from crude lipase type VII (used in the experiment) (lipase1: pI= 4.8, lipase3: pI -5.8)
References