

Supporting Information

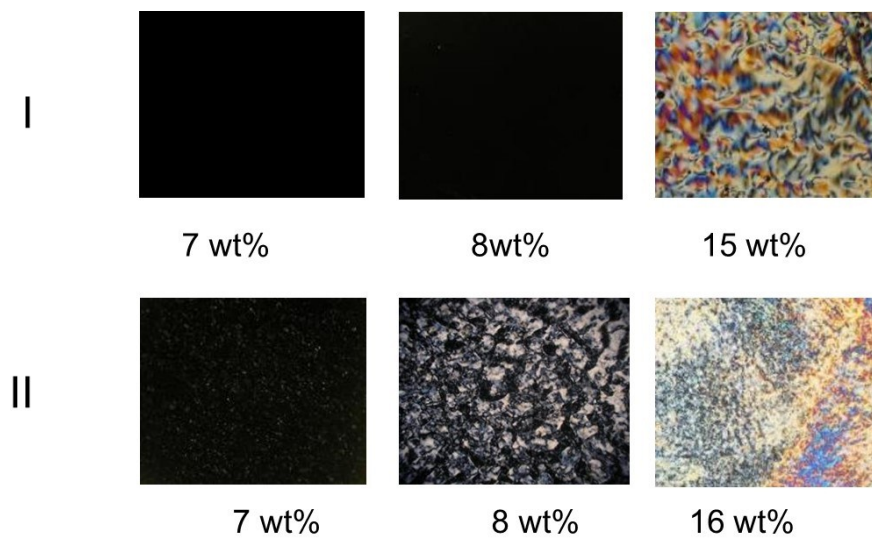
# Cromoglycate Mesogen Forms Isodesmic Assembly Promoted by Peptides and Induces Aggregation of a Range of Proteins

Arizza Chiara S. Ibanez,<sup>a</sup> Elaine Marji<sup>a†</sup> Yan-Yeung Luk<sup>a\*</sup>

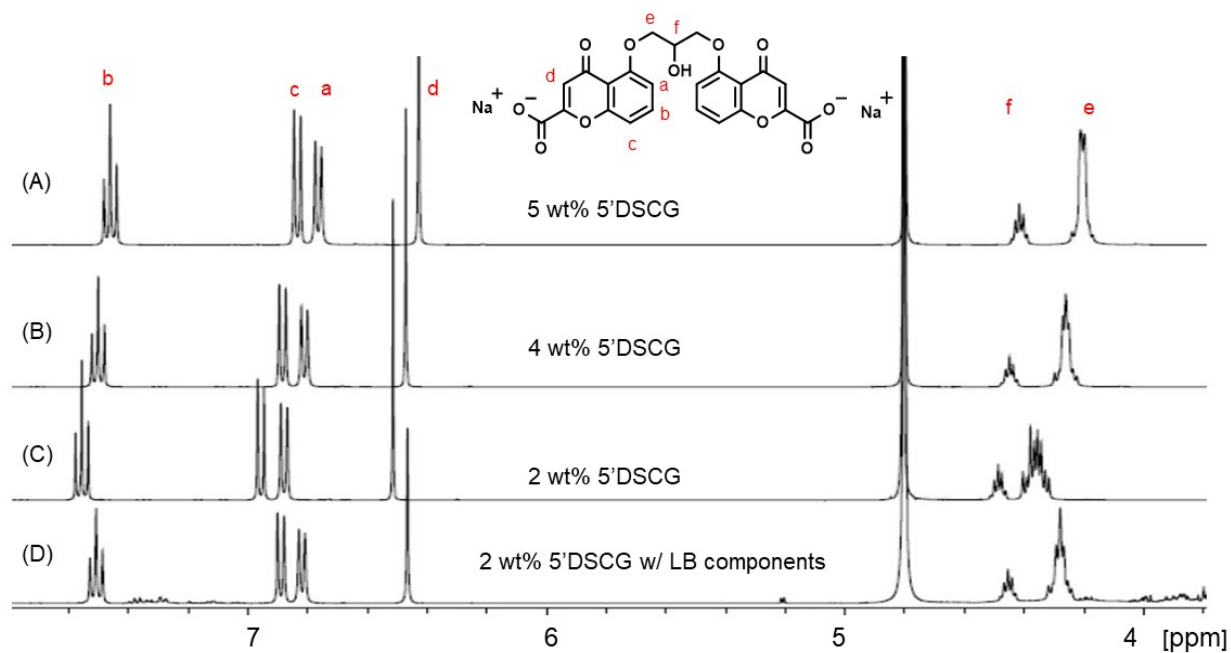
<sup>a</sup>Chemistry Department, Syracuse University, Syracuse, NY 13244-4100, United States

† Undergraduate researcher

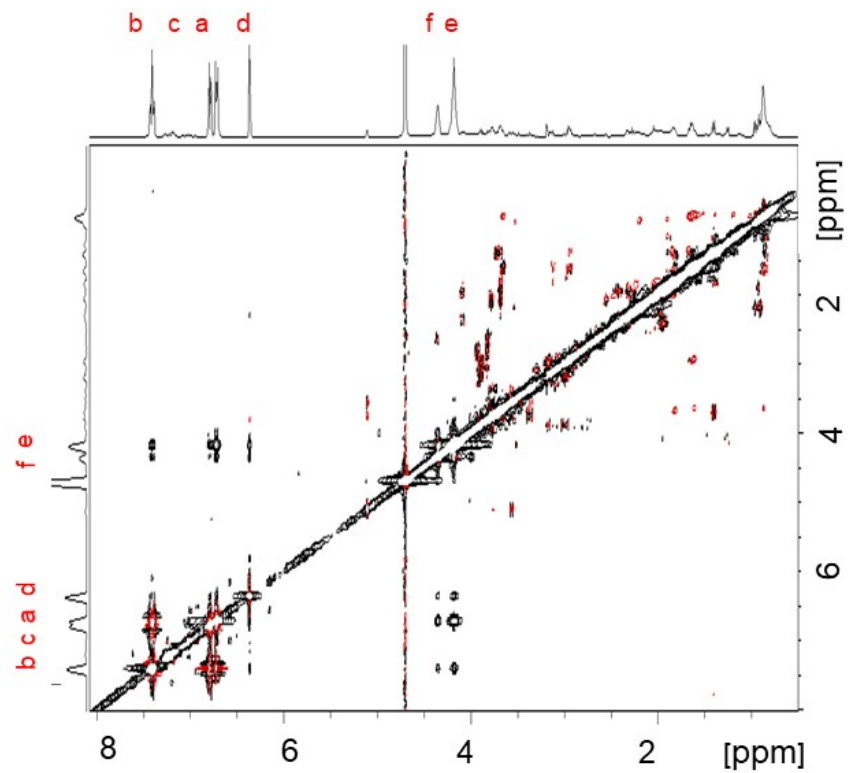
\*Corresponding author: E-mail: [yluk@syr.edu](mailto:yluk@syr.edu)



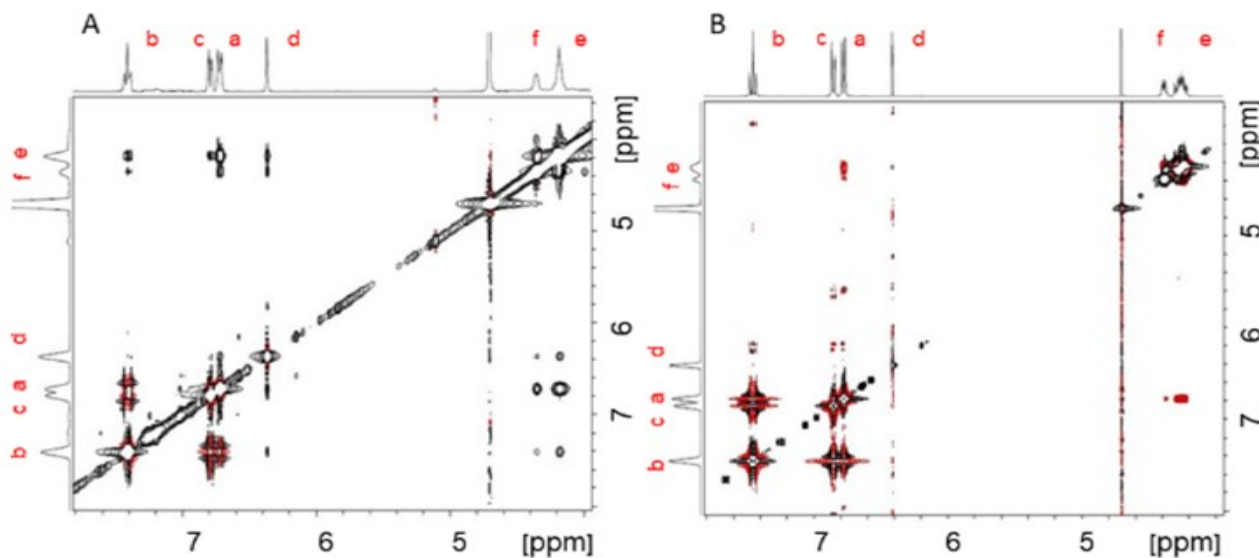
**Figure S1** Images of 5' DSCG solutions at different concentrations in (I) Millipore water (II) Luria Bertani (LB) media (1 wt% sodium chloride, 1 wt% tryptone and 0.5 wt% yeast extract) viewed under cross polars.



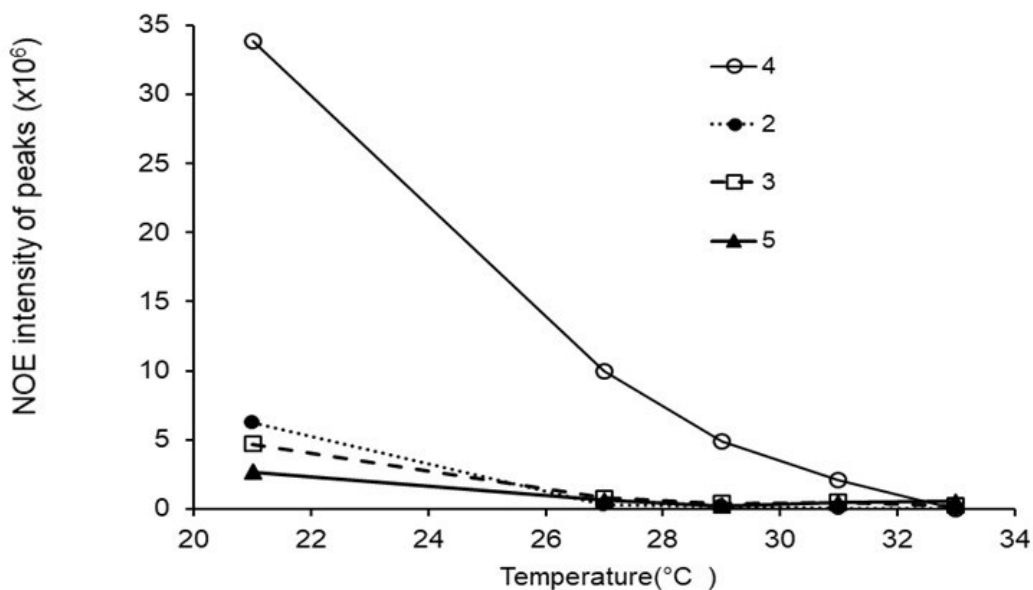
**Figure S2** <sup>1</sup>H NMR spectra of 5 wt% 5'DSCG (A), 4 wt% 5'DSCG (B), 2 wt% 5'DSCG without (C) and with LB components (D) in D<sub>2</sub>O. The protons of 5'DSCG and peak assignments are labelled in red.



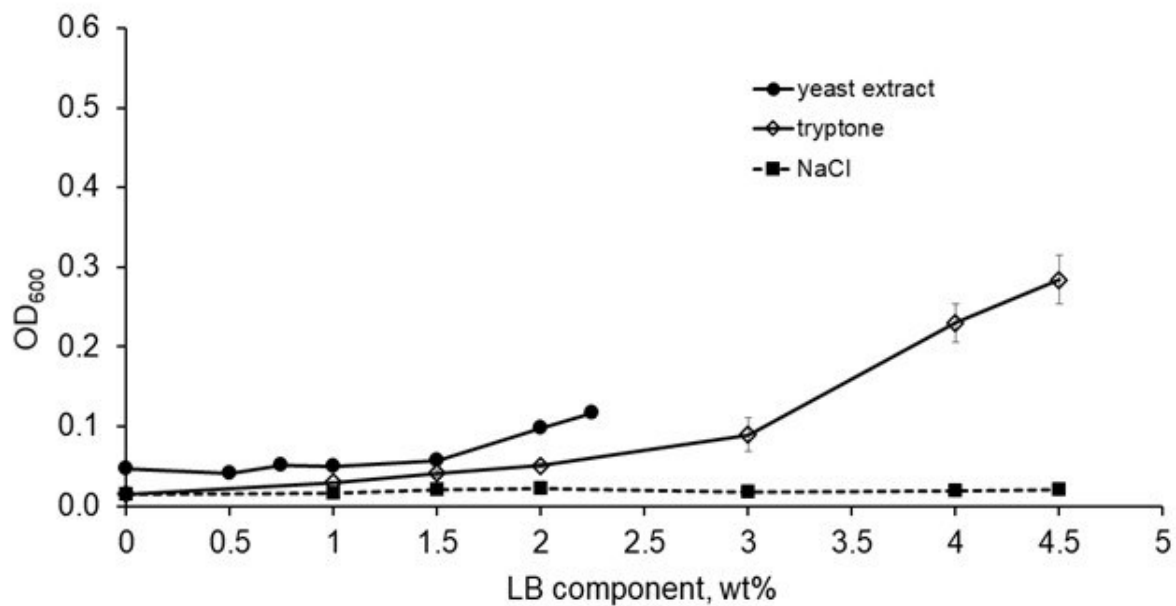
**Figure S3** NOESY spectra of 2 wt% 5'DSCG with LB components (1 wt% sodium chloride, 1 wt% tryptone and 0.5 wt% yeast extract).



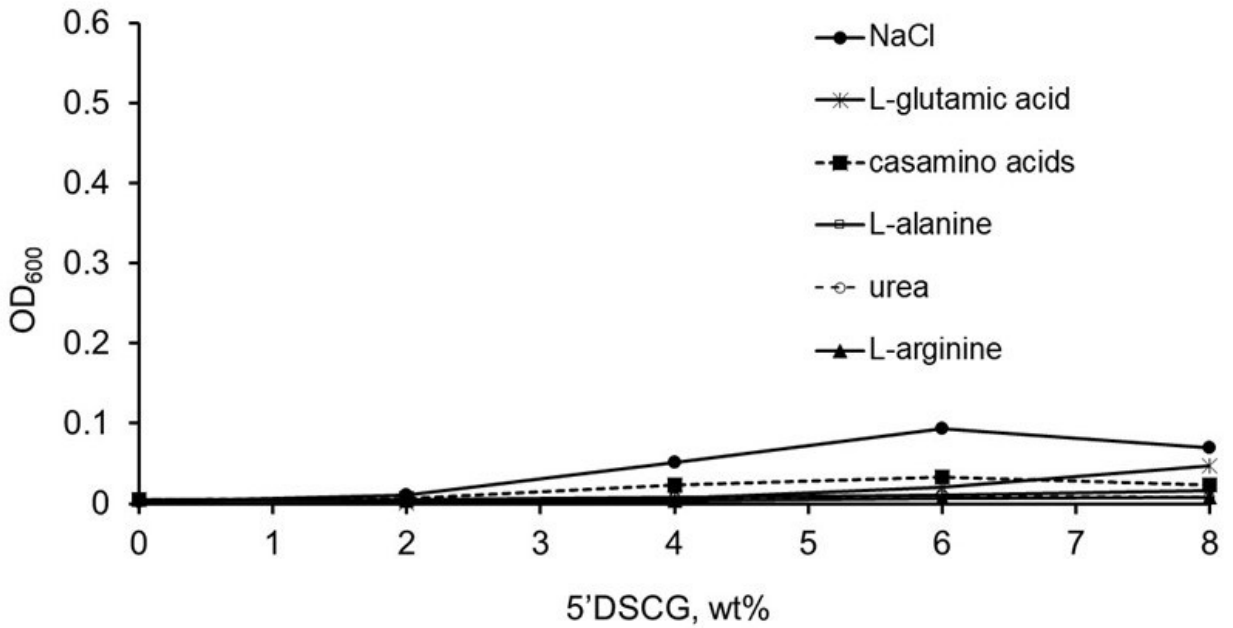
**Figure S4** NOESY spectra of 2 wt% 5'DSCG with (A) and without (B) LB components in D<sub>2</sub>O. Same phase (with respect to the diagonal) NOE cross-peaks in black and opposite phase (with respect to the diagonal) NOE cross-peaks in red. The protons of 5'DSCG and peak assignments are labelled in red.



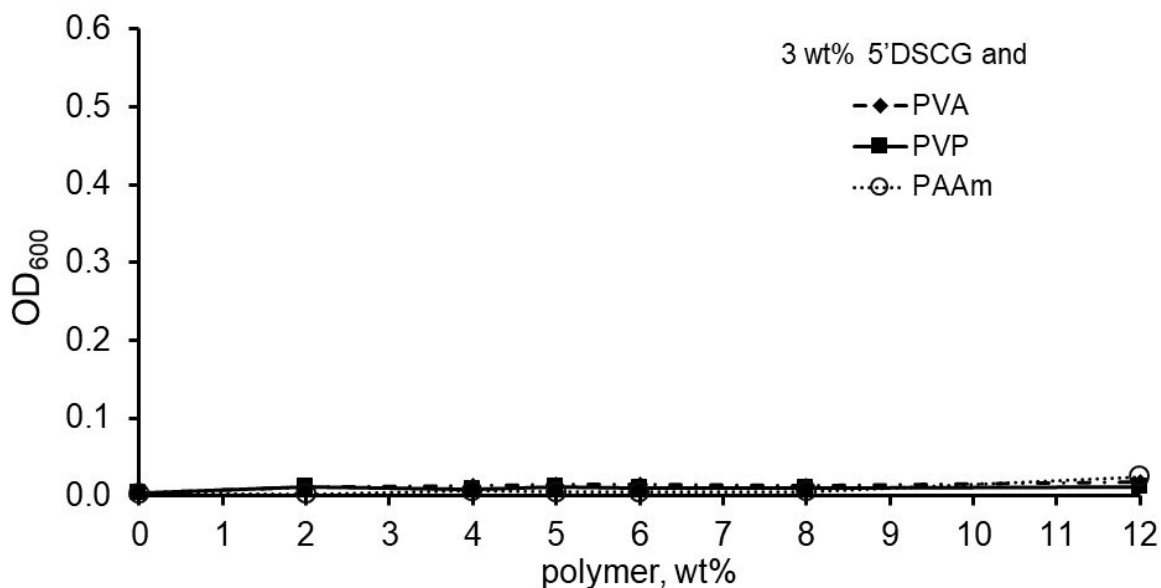
**Figure S5** Plot of intensity of NOE cross peaks vs. temperature for 2 wt% 5'DSCG with LB components.



**Figure S6** Optical density (OD<sub>600</sub>) 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<sub>600</sub>) 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.



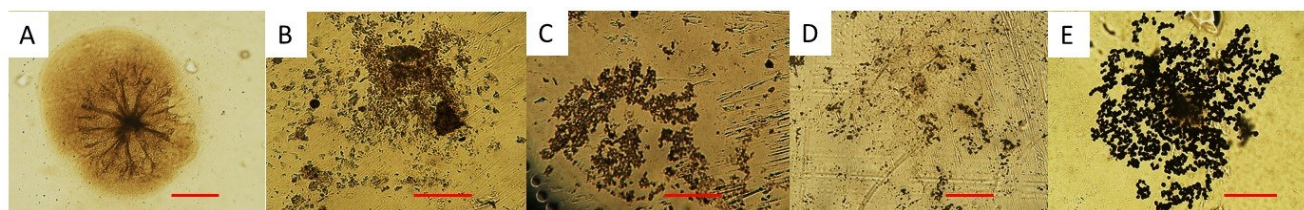
**Figure S8** Optical density (OD<sub>600</sub>) measurements of solutions containing 3 wt% 5'DSCG mixed with different concentrations of non-ionic polymers: poly-vinylalcohol (PVA, mw ~ 9,000-10,000), poly-vinylpyrrolidone (PVP, mw ~40,000), and poly-acrylamide (PAAm, mw ~ 9,000-10,000)

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

	Reservoir Solution			
	2.8 wt% NaCl	0.25 wt% 5'DSCG	0.5 wt% 5'DSCG	1 wt% 5'DSCG
5 mg/mL powder	no precipitate	with precipitate <sup>1</sup>	with precipitate <sup>2</sup>	no precipitate
10 mg/mL powder	no precipitate	with precipitate <sup>1</sup>	with precipitate <sup>2</sup>	no precipitate
20 mg/mL powder	no precipitate	with precipitate <sup>1</sup>	with precipitate <sup>2</sup>	no precipitate

Precipitate observed after 3 days<sup>1</sup> and 5 days<sup>2</sup>





**Figure S9** Different protein aggregates induced by 5'DSCG in hanging droplets. The droplets (5  $\mu$ L) 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  $\mu$ L 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 = 380 $\mu$ m

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

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

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

<sup>b</sup>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

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