Supporting information

Chemically modified gellan gum hydrogels with tunable properties for use as tissue engineering scaffolds

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1. Methods and materials

1.1. Molecular weight measurement

The molecular weight of gellan gum (GG), low modified gellan gum (LMGG) and high modified gellan gum (HMGG) were extrapolated by intrinsic viscosity measurements using the Mark-Houwink relationship:

$$[\eta]=K(M_v)^{\alpha} \tag{1}$$

where [η] is intrinsic viscosity of the polymer, K and α are the Mark-Houwink constants for a given polymer-solvent system, and M_v is viscosity average molecular weight of the polymer. Based on a previous report, K and α for aqueous gellan gum are 7.48×10^{-5} L/g and 0.91, respectively[1].

The intrinsic viscosities of GG, LMGG, and HMGG were extrapolated via equation 2 through measuring relative viscosity η_r and specific viscosity η_{sp} at a series of polymer concentration by U-tube viscometer.

$$[\eta]=\lim_{C\to0}\ \eta_{sp}=\lim_{C\to0}\ ln\eta_r/C \tag{2}$$

where η_r is measured directly by comparing the elution time of pure solvent water and aqueous gellan gum. The viscosity of a polymer-solvent can be approximated as

$$\eta = A\rho t \tag{3}$$

where t is the elution time, ρ is the density of the polymer-solvent, and A is a constant of the viscometry. Therefore, η_r can be approximated using equation 4:

$$\eta_r=\frac{t}{t_0} \tag{4}$$

where t_0 is the elution time of pure solvent and t is elution time of the polymer-solvent. η_{sp} was calculated using the relative relationship between η_r and η_{sp}:

$$\eta_{sp}=\eta_r-1 \tag{5}$$

Using the above theory, a series of concentrations of GG, LMGG, and HMGG were prepared and the elution time were measured with a U-tube viscometer. For each type of gellan gum, $\frac{\eta_{sp}}{C}$ –C and $\frac{ln\eta_r}{C}$-C were plotted. Two obtained lines should have the same y-intercept, which is [η]. The viscosity average molecular weight was calculated using the above mentioned K and α constants. The results are shown in **Figure S1.**

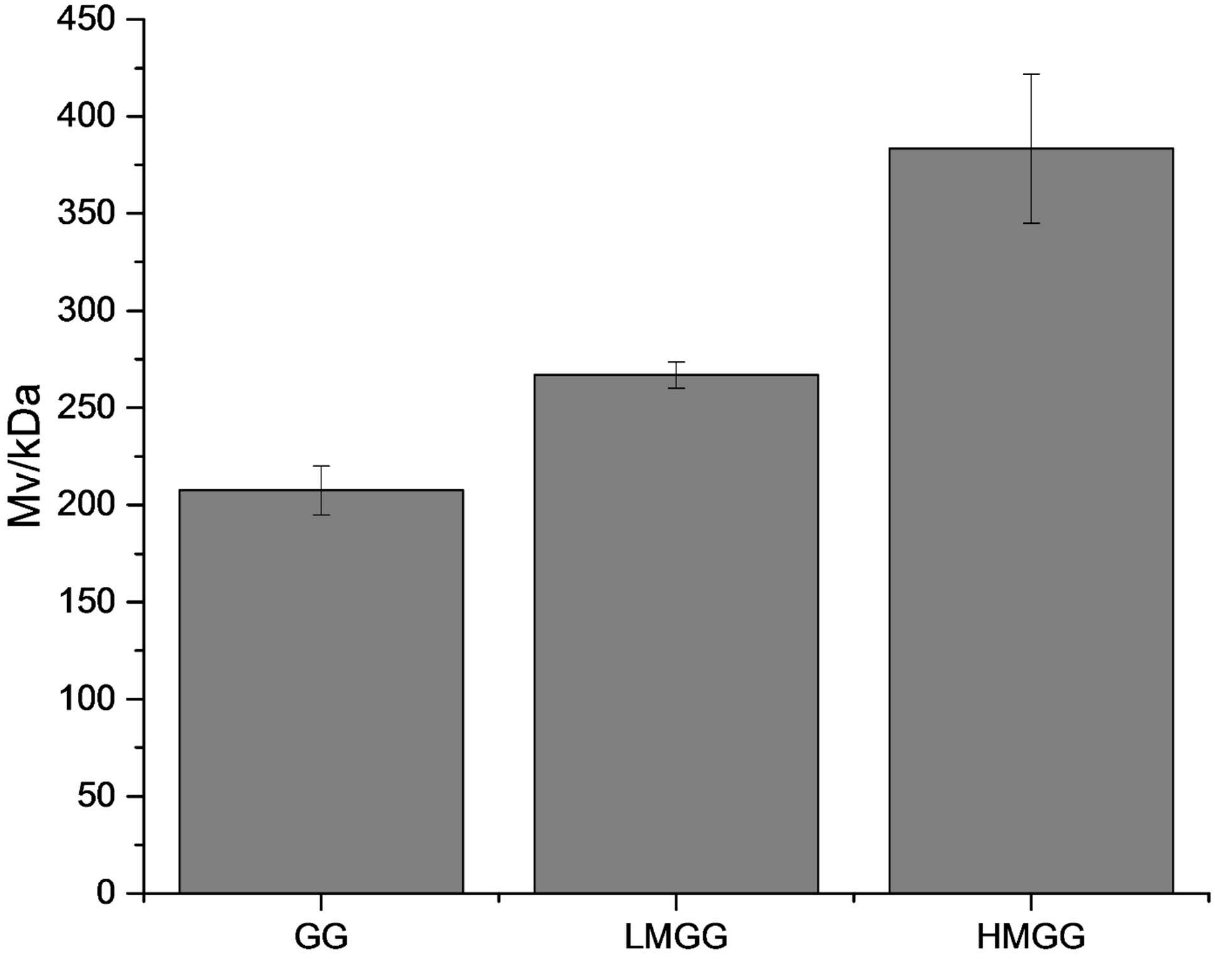

Figure S1. Viscosity average molecular weight of GG, LMGG and HMGG.

Reference

1. Dreveton, E., Monot, F., Lecourtier, J., Ballerini, D., and Choplin, L. "**Influence of Fermentation Hydrodynamics on Gellan Gum Physico-Chemical Characteristics**" *Journal of Fermentation and Bioengineering* 82, no. 3 (1996): 272–276. doi:10.1016/0922-338X(96)88819-2