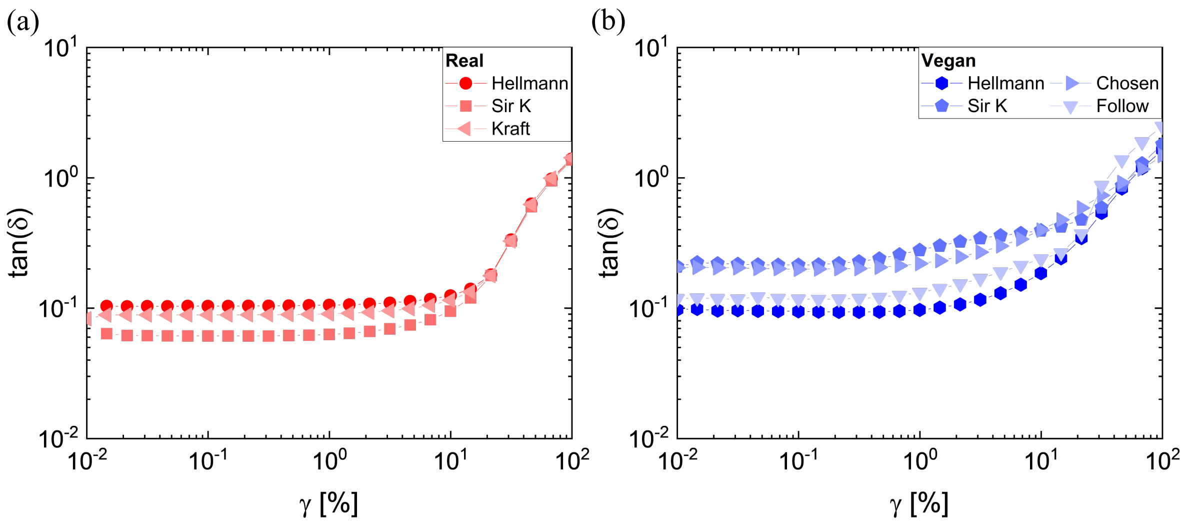
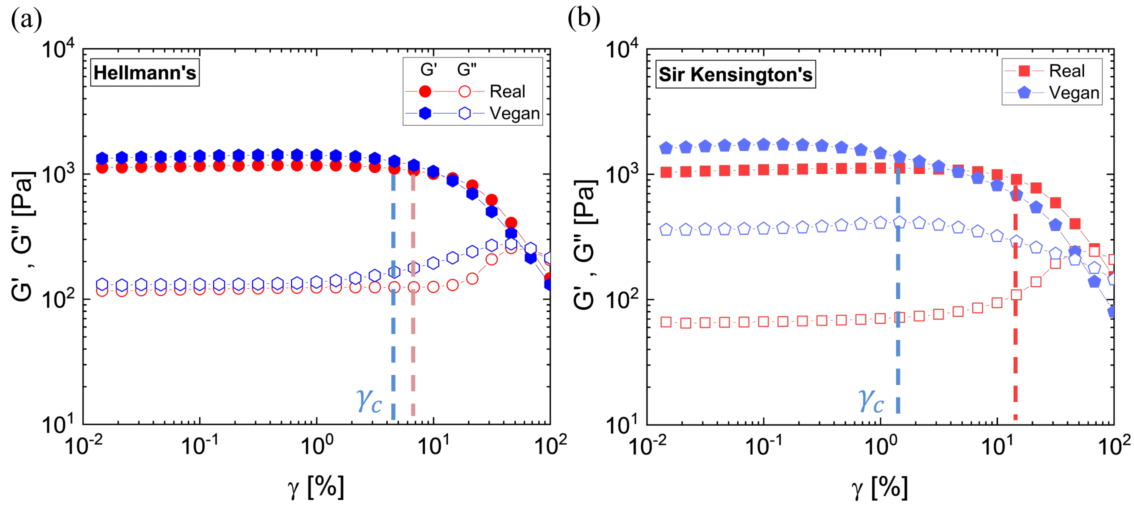
Supplementary Information
for
Rheological Matchup of Real and Plant-based Mayo: Gel Strength, Strain Overshoot, and Yielding, plus the Extended Cox-Merz Rule



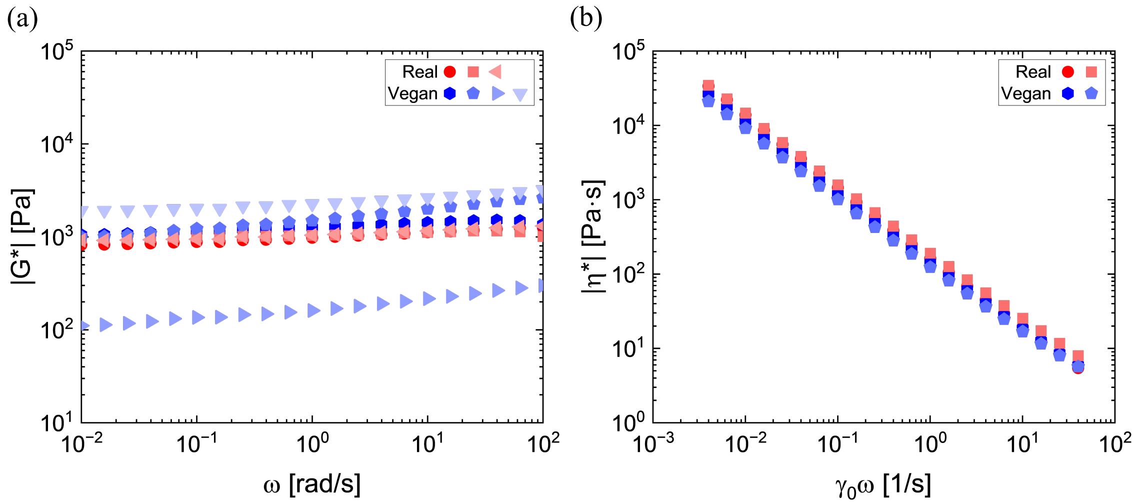
Supplementary Figure SF1: Loss tangent, or $\tan(\delta)$, of real and vegan mayos. In the main paper, the yield stresses determined from the G', G'' crossover strain (γ_x) correspond to the strain at which $\tan(\delta) = 1$. In general, the real mayonnaises had a similar γ_x, whereas the vegan mayos showed variability.

The ratio of loss to storage moduli, also called loss tangent, $\tan(\delta) = G''/G'$ or damping factor, captures the relative propensity for showing liquid-like response. A deviation from low-strain linearity in G' is observed at $\tan(\delta) = 1$ and a crossover between elastic and viscous behavior is denoted in Figure 2 in the main text. Materials with $\tan(\delta) < 1$ predominantly show solid-like behavior, as seen in all samples at lower amplitude strains. Above the transition point, $\tan(\delta) > 1$, indicating predominantly liquid-like bulk behavior. This can be a measure of yield stress, as mentioned in the main text with γ_x yield point. Real mayonnaises show a very similar loss tangent response, whereas vegan mayos show variation, corresponding to differences in microstructure and yielding.



Supplementary Figure SF2: Storage and loss moduli for (a) Hellmann's real and vegan mayo and (b) Sir Kensington's real and vegan mayo.

The G' and G'' responses to strain amplitude sweep experiments for Hellmann's and Sir Kensington's brand AB and PB mayos are shown in SI Figure 2. The γ_c critical strain, or dropoff of the G' from the LVE is denoted with the dashed vertical line. For Hellmann's mayos, the difference between the γ_c for real and vegan mayo is slight, but for Sir Kensington's mayos, the difference in the yield point is distinct. In both cases, the PB mayo has a lower critical strain, indicating a weaker microstructure compared to the AB counterparts.



Supplementary Figure SF3: (a) SAOS complex modulus plotted versus frequency $\gamma = 0.1\%$ for all seven Mayo samples. (b) LAOS complex viscosity plotted versus effective shear rate at $\gamma_0 = 40\%$.

The $|G^*|$ response is nearly frequency independent for real mayos, whereas the vegan mayos exhibit a weak frequency dependence. Despite a lower yield stress than the real mayos, three vegan mayos display higher modulus or apparent stiffness or firmness at low strains. On the other hand, the modulus of complex viscosity, $|\eta^*|$ exhibits shear-thinning over the entire range of the effective shear rates obtained at higher strain amplitudes used following the discussion in the main text for the extended Cox-Merz rule. The curves included only for Hellmann's and Sir K's AB and PB mayos are nearly overlapping, reproducing similar behavior as observed in shear viscosity vs shear rate measurements, indicating that a similar reduction in viscosity over a matched range of rates occurs for these mayos.