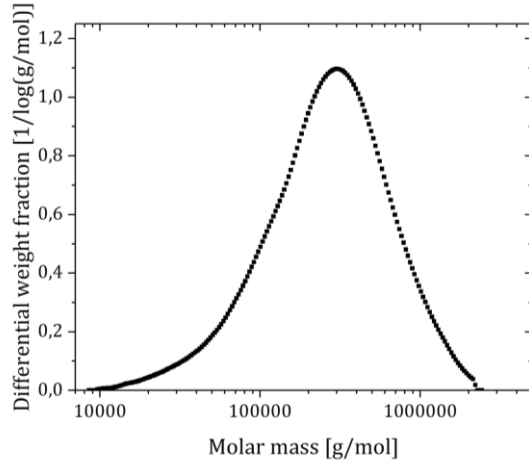


Appendix A

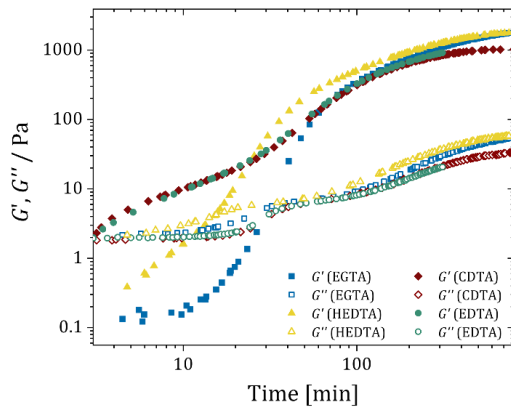
The results obtained from SEC measurements on the used sodium alginate are represented in **Erreur ! Source du renvoi introuvable.**



SI 1: Molar mass distribution of sodium alginate used in this study.

Appendix B

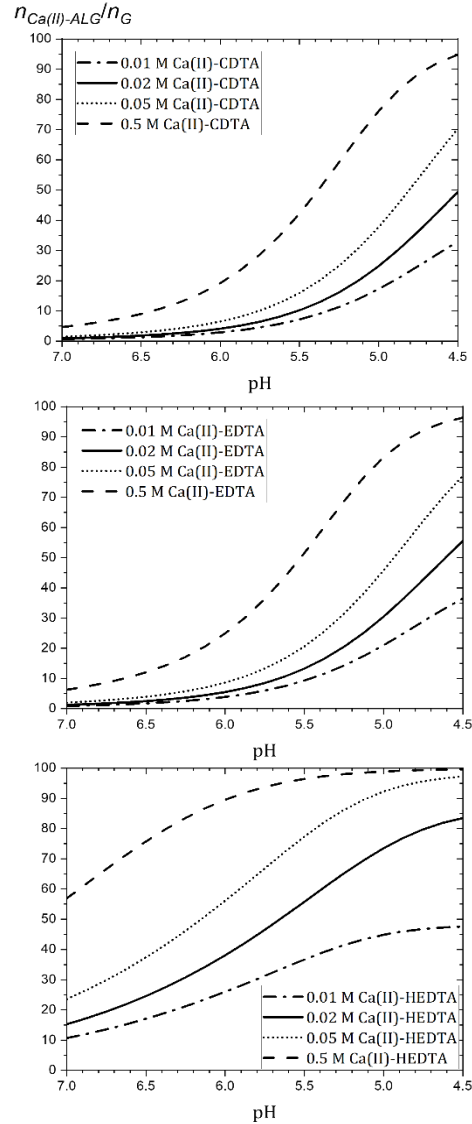
The viscous shear moduli G'' as a function of time corresponding to the temporal evolution of elastic shear moduli shown in **Erreur ! Source du renvoi introuvable.** are presented here (SI 2) together with the elastic shear moduli G' to complete the information on these measurements.



SI 2: Temporal evolution of the elastic shear modulus G' and the viscous shear modulus G'' of 0.02 M Ca(II) complex solution mixed with 1 wt % alginate after addition of 1 wt % GDL determined by shear rheology.

Appendix C

In Section 3.1.2 we showed the influence of the calcium complex concentration on the degree of alginate cross-linking in the pH range of 4.5 - 7 for EGTA-based complexes only as an example. In SI 3 we present results of the same simulations carried out for CDTA, EDTA, and HEDTA.



SI 3: Fraction of Ca-ALG relative to the number of moles of gluconic acid in 1 wt % of alginate as a function of pH for different Ca-Ligand concentrations containing 1 wt % GDL.

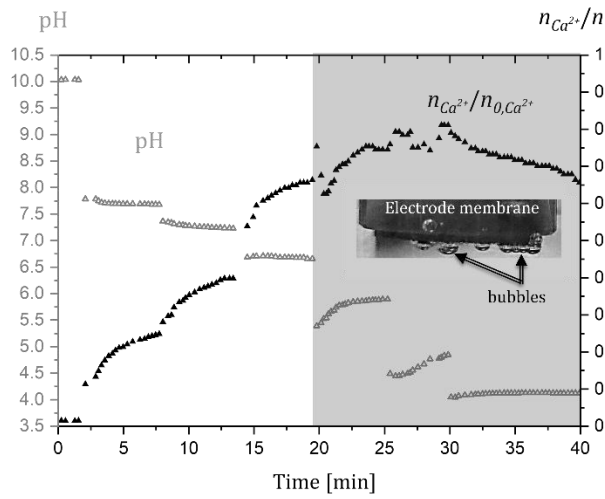
Appendix D

To decouple the kinetics of GDL hydrolysis and particle dissolution (similar to calcium decomplexation in Section 3.1.1), we follow calcium release over time at different fixed gluconic acid concentrations (SI 4).

SI 4 shows a temporal evolution of the released amount of Ca(II) at a constant gluconic acid concentration and requires several minutes to reach a stable value contrary to the behavior observed for calcium-based complexes (**Erreur ! Source du renvoi introuvable.**) which presented plateaus of released Ca(II) at each fixed pH.

The grey zone corresponds to data acquired under the release of CO_2 in the sample solution which represents interferences in measurements due to the presence of gas bubbles at the surface of the

electrode membrane. Considering the acidic character of the CO_2 , its transformation from liquid CO_2 to gas and removal from the sample solution results in increasing pH at a constant concentration of gluconic acid before reaching an equilibrium.



SI 4: Kinetics of dissolution of 0.02 M CaCO_3 acidified using a solution of gluconic acid as the acidifying agent (multi-dose addition, 0.1 wt %, 0.2 wt %, 0.6 wt %, 1 wt %, 1.3 wt %, 1.7 wt %).