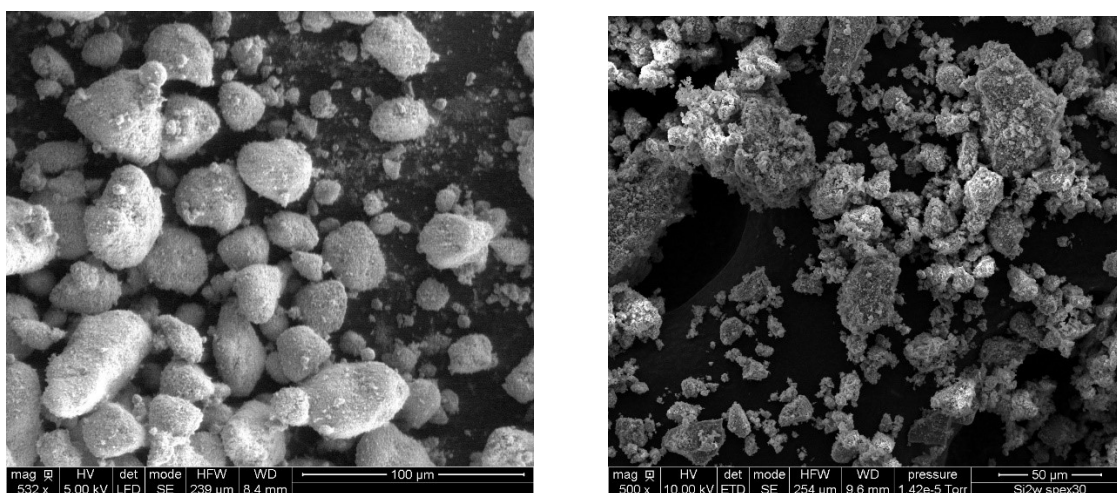


## The formulation of CMC binder/silicon composite anode for Li-ion batteries: from molecular effect of ball milling onto polymer chains to consequences on electrochemical performances

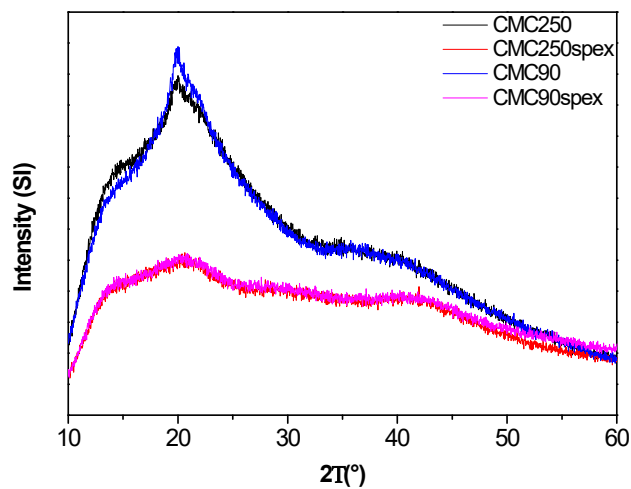
Mariama NDOUR<sup>a,b</sup>, Jean-Pierre BONNET<sup>a\*</sup>, Sébastien CAVALAGLIO<sup>a</sup>, Tristan LOMBARD<sup>a</sup>, Matthieu COURTY<sup>a</sup>,  
Luc AYMARD<sup>a</sup>, Cédric PRZYBYLSKI<sup>c,d</sup>, Véronique BONNET<sup>b\*</sup>

### Supporting Information

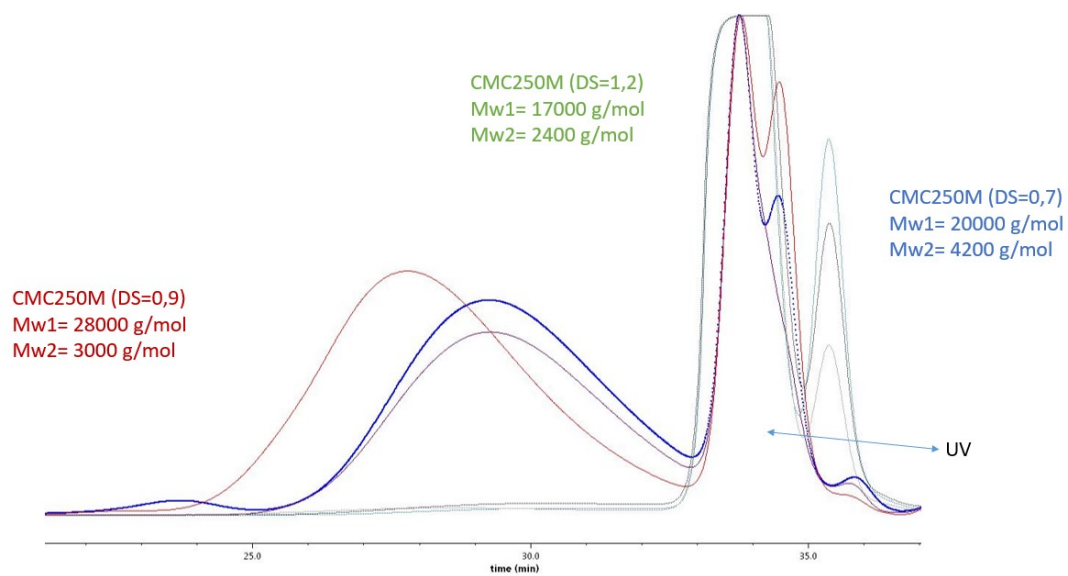
- Figure S1.** SEM imaging of silicon before and after SPEX milling p.1
- Figure S2.** Diffractograms of CMC250 and CMC90 (DS = 0.7). p.2
- Figure S3.** SEC with RI detection (blue, red and green traces) and UV-detection. p.2
- Figure S4.** Full FT-IR spectra of CMC250. p.3
- Figure S5.** Proposed structures issued from the CMC degradation under acidic aqueous conditions and ball milling. p.3
- Figure S6.** TGA curves of CMC90, 250 and 700. p.4
- Figure S7.** SEM imaging of silicon-based electrodes with CMC90 and 250. p.5



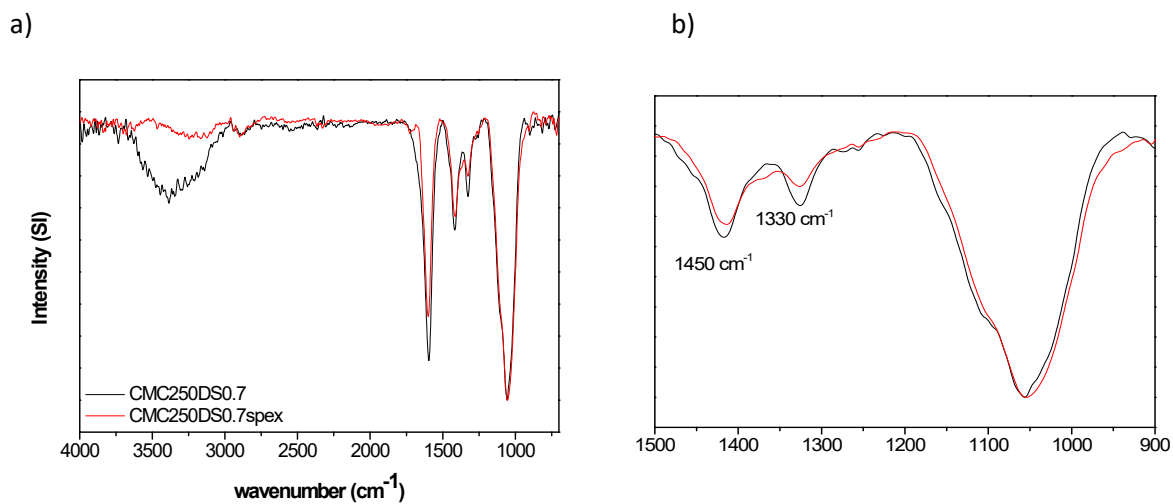
**Figure S1.** Scanning Electron Microscopy (SEM) imaging of silicon before and after SPEX milling



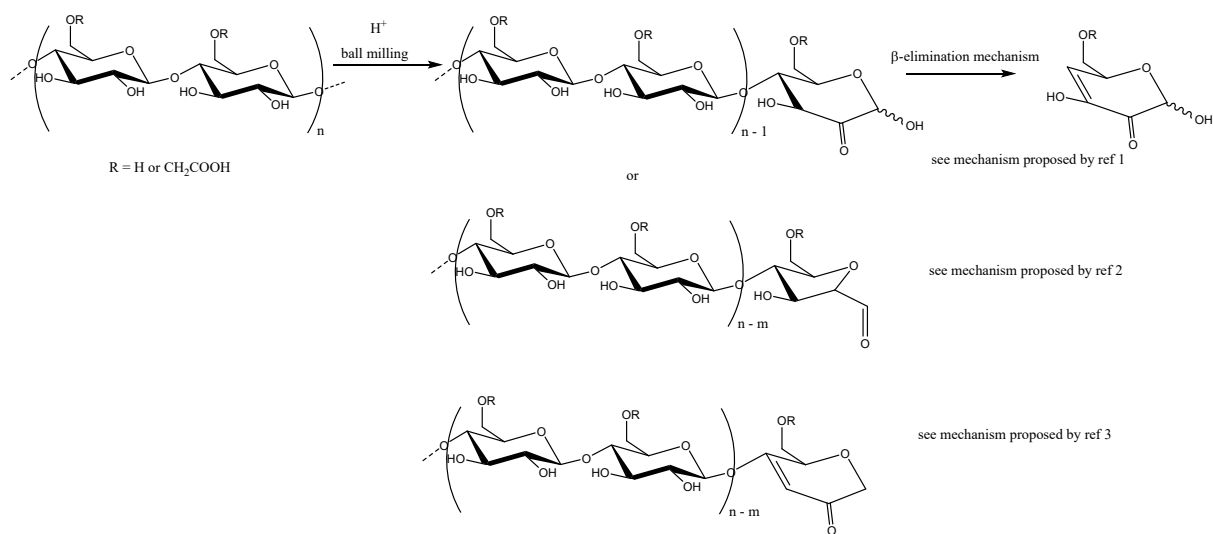
**Figure S2.** Diffractograms of CMC 250 and CMC 90 (DS = 0.7) before (black and blue trace, respectively) and after 30 min ball-milling treatment (red and pink trace, respectively).



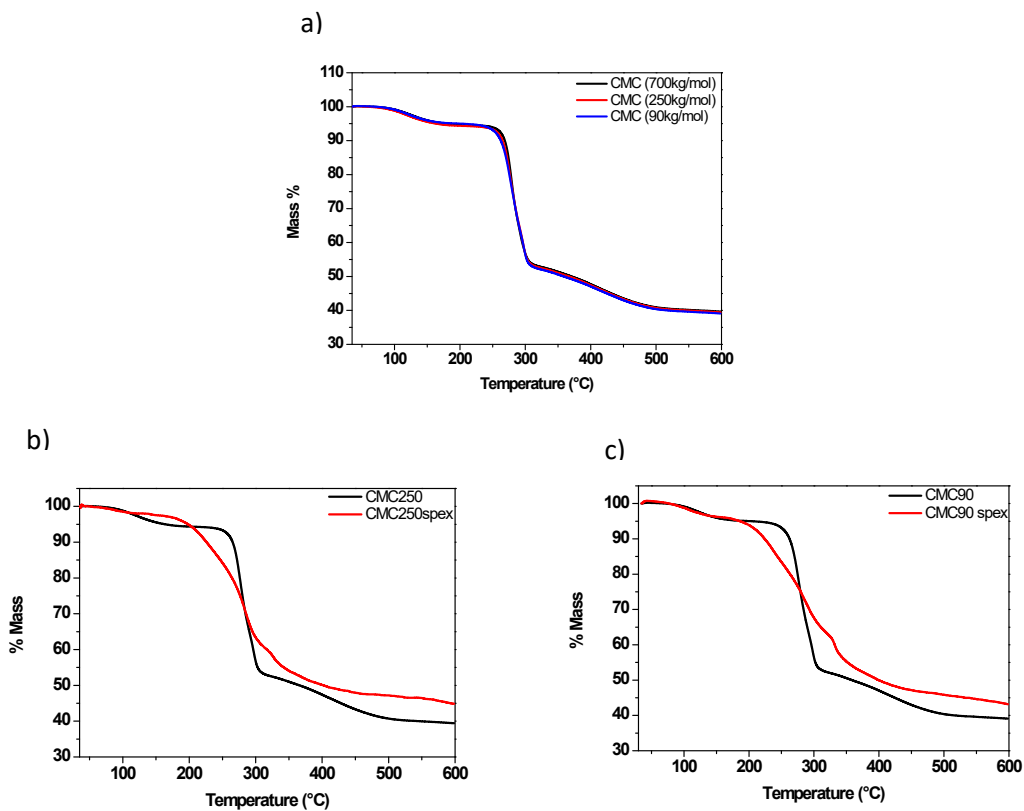
**Figure S3.** SEC with RI detection (blue, red and green traces) and UV-detection (grey traces) ( $\lambda=280$  nm) based Chromatograms of CMC (DS = 0.7, 0.9 or 1.2) after 30 min ball-milling treatment.



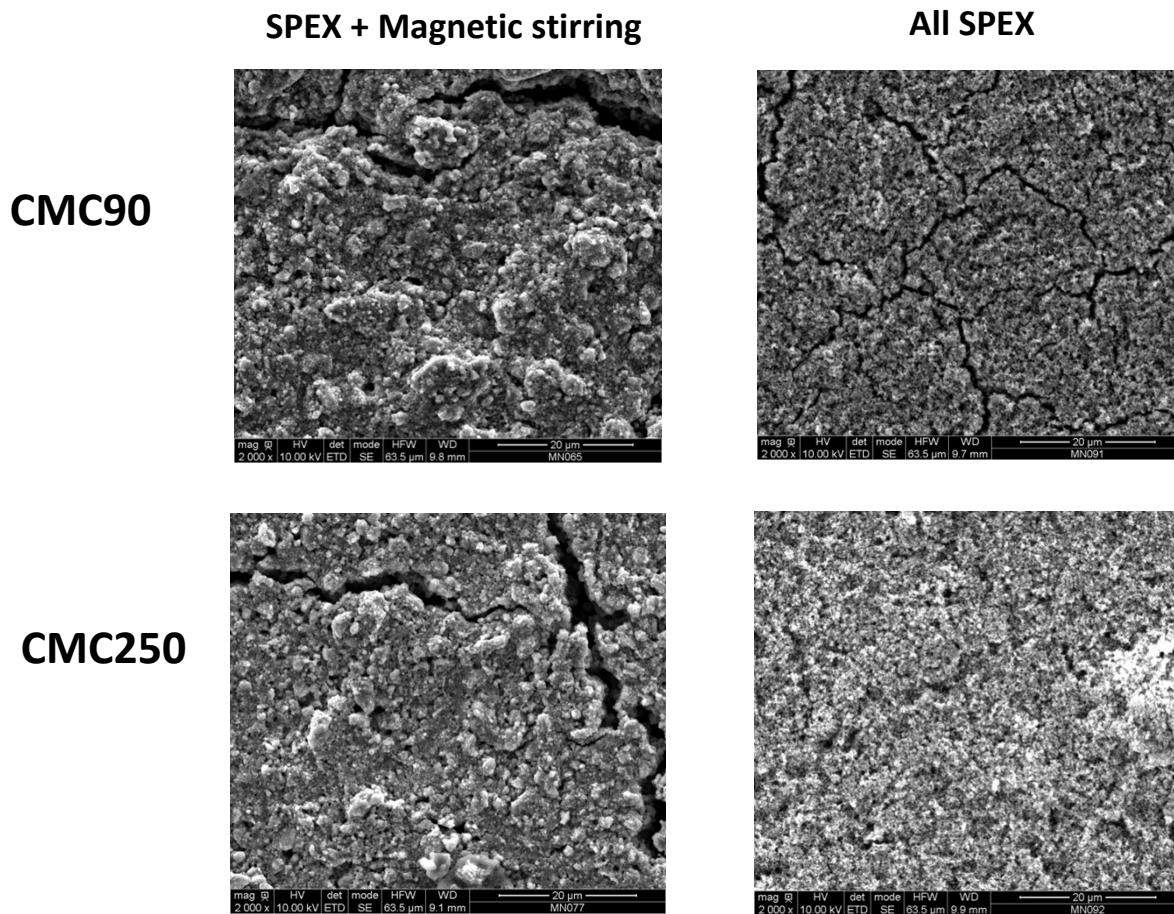
**Figure S4.** Full FT-IR spectra of CMC 250 (a) and enlargement between 900-1500  $\text{cm}^{-1}$  (b) (DS = 0.7) before (black trace) and after (red trace) 30 min ball-milling treatment.



**Figure S5.** Proposed structures issued from the CMC degradation under acidic aqueous conditions and ball milling.



**Figure S6.** TGA curves of a) commercial CMC90 (blue trace), 250 (red trace) and 700 (black trace), b) CMC250 before (black trace) and after (red trace) 30 min ball-milling treatment and c) CMC90 before (black trace) and after (red trace) 30 min ball-milling treatment.



**Figure S7.** SEM imaging of silicon-based electrodes with CMC90 (above) and 250 (bottom) as binder from: SPEX + magnetic stirring or all-SPEX formulations.

## References

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