



UNIVERSITY OF LEEDS

This is a repository copy of *Processing Induced Changes in Food Proteins: Amyloid Formation during Boiling of Hen Egg White*.

White Rose Research Online URL for this paper:
<http://eprints.whiterose.ac.uk/161872/>

Version: Supplemental Material

Article:

Monge-Morera, M, Lambrecht, MA, Deleu, LJ et al. (6 more authors) (2020) Processing Induced Changes in Food Proteins: Amyloid Formation during Boiling of Hen Egg White. *Biomacromolecules*, 21 (6). pp. 2218-2228. ISSN 1525-7797

<https://doi.org/10.1021/acs.biomac.0c00186>

This document is the Accepted Manuscript version of a Published Work that appeared in final form in *Biomacromolecules*, copyright © American Chemical Society after peer review and technical editing by the publisher. To access the final edited and published work see <https://doi.org/10.1021/acs.biomac.0c00186>.

Reuse

Items deposited in White Rose Research Online are protected by copyright, with all rights reserved unless indicated otherwise. They may be downloaded and/or printed for private study, or other acts as permitted by national copyright laws. The publisher or other rights holders may allow further reproduction and re-use of the full text version. This is indicated by the licence information on the White Rose Research Online record for the item.

Takedown

If you consider content in White Rose Research Online to be in breach of UK law, please notify us by emailing eprints@whiterose.ac.uk including the URL of the record and the reason for the withdrawal request.



eprints@whiterose.ac.uk
<https://eprints.whiterose.ac.uk/>

Processing induced changes in food proteins: amyloid formation during boiling of hen egg white

Margarita Monge-Morera¹, Marlies A. Lambrecht¹, Lomme J. Deleu¹, Rodrigo

Gallardo^{2,3}, Nikolaos N. Louros², Matthias De Vleeschouwer², Frederic Rousseau^{2},*

Joost Schymkowitz^{2}, Jan A. Delcour^{1*}*

¹KU Leuven, Laboratory of Food Chemistry and Biochemistry and Leuven Food Science

and Nutrition Research Centre (LFoRCe), Kasteelpark Arenberg 20, B-3001 Leuven,

Belgium

²KU Leuven, Switch laboratory, Department of Cellular and Molecular Medicine,

Herestraat 49, B-3001 Leuven, Belgium

³University of Leeds, Astbury Centre for Structural Molecular Biology, School of

Molecular and Cellular Biology, Garstang Building, LS2 9JT Leeds, United Kingdom

*Corresponding authors: frederic.rousseau@kuleuven.vib.be (Tel: +3216372572),

joost.schymkowitz@kuleuven.vib.be (Tel: +3216372573), jan.delcour@kuleuven.be (Tel:

+3216321581)

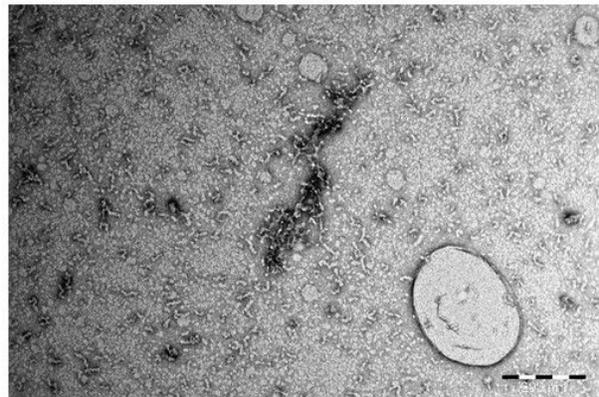
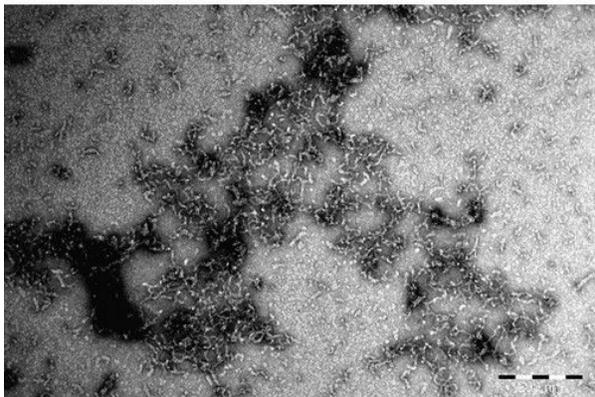
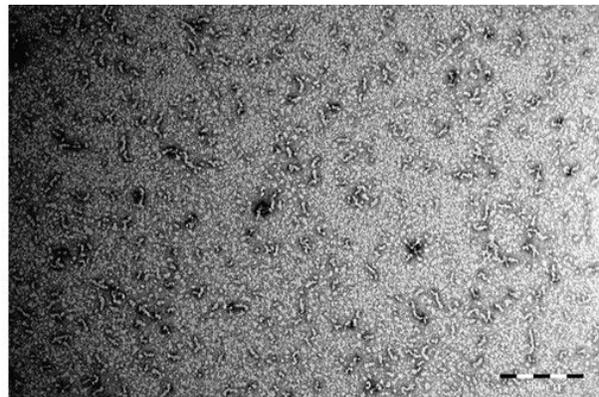
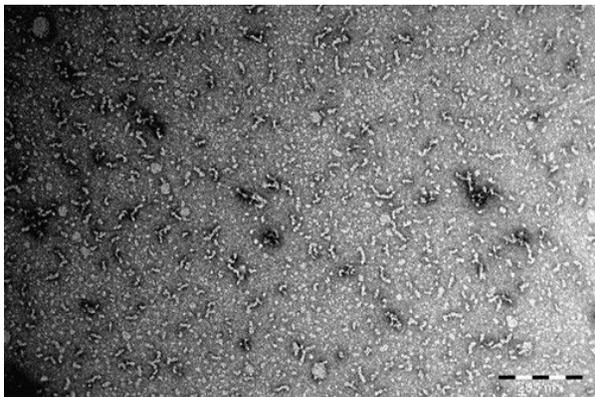


Figure S1. Morphology of amyloid proteins fibril derived from egg white (EW) boiled for 15 min ($EW_{100/15min}$). TEM images after the solubilisation with 0.01 M of hydrochloric acid of the $EW_{100/15min}$ pellet obtained during proteinase K incubation. Images shown different locations of the same grid. Scale bar: 200 nm.

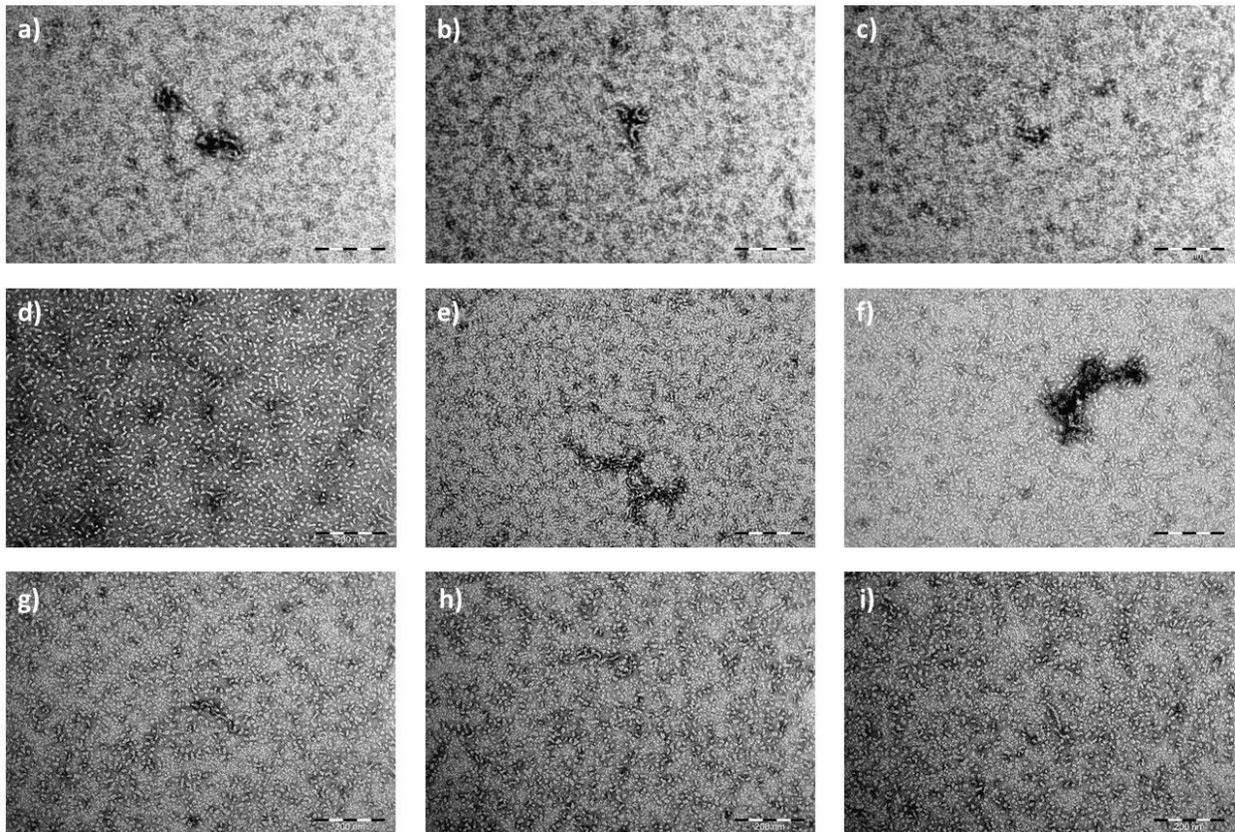


Figure S2. Protein fibril morphology of unheated, heated and boiled ovalbumin (OVA). TEM images of unheated [(a) to (c)] and heated ovalbumin for 22 h at 78 °C [(d) to (f)];

OVA_{78/22h}] and for 15 min at 100 °C [(g) to (i); OVA_{100/15min}]. Images per row are from different locations in the same grid. Scale bar: 200 nm.

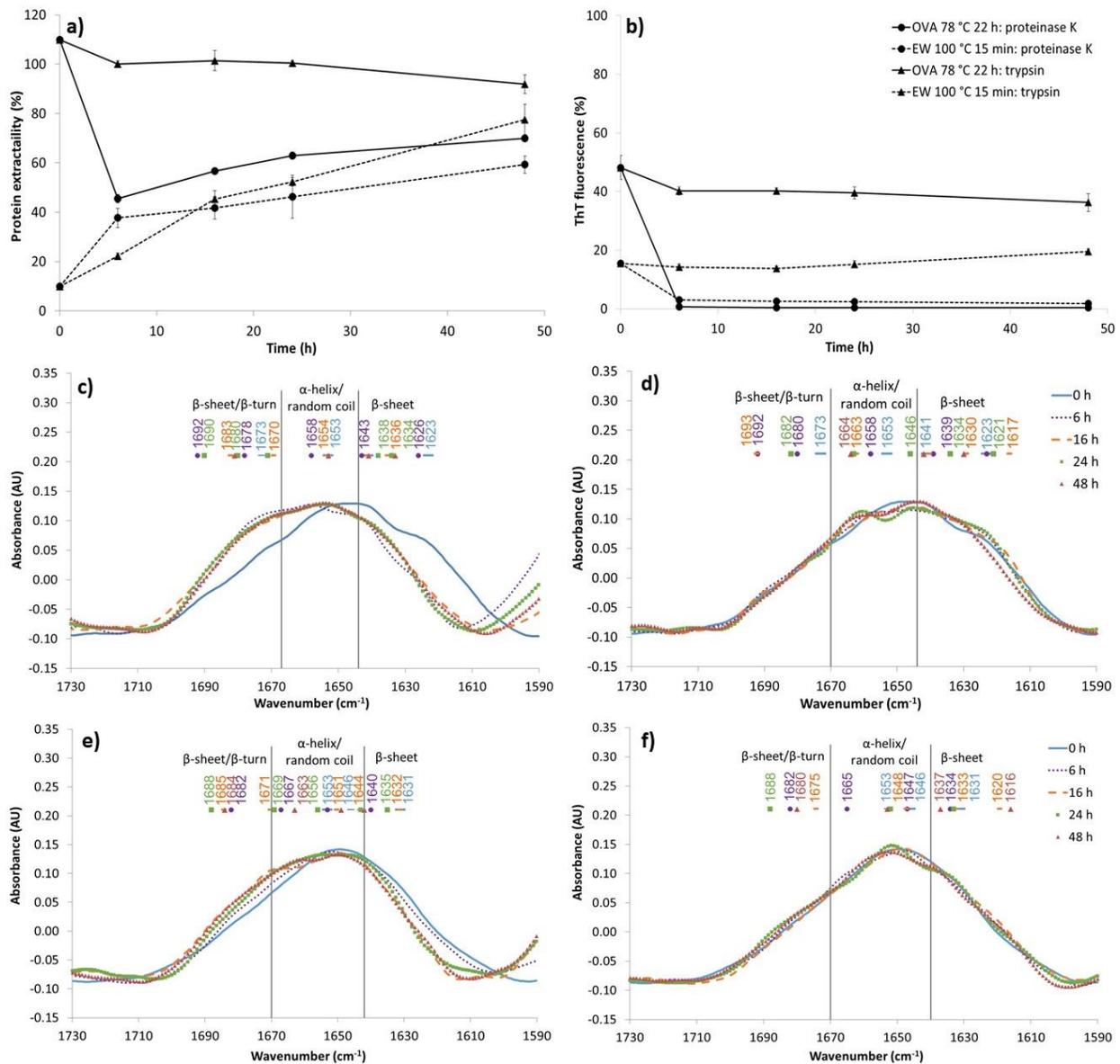


Figure S3. Impact of proteases on protein fibril extractability of heated ovalbumin ($OVA_{78/22h}$) and boiled egg white ($EW_{100/15min}$) over time. Protein extractability (a) and thioflavin T (ThT) [b] of $OVA_{78/22h}$ and $EW_{100/15min}$ treated with proteinase K and trypsin over time. FTIR spectrum of $OVA_{78/22h}$ [(c) and (d)] and $EW_{100/15min}$ [(e) and (f)] treated with proteinase K [(c) and (e)] and trypsin [(d) and (f)]. Wavenumbers shown are detected

with the peak picking tool based on the second derivative. Vertical lines in c, d, e and f separate the wavenumbers assigned to the secondary structure of proteins. AU, arbitrary units.

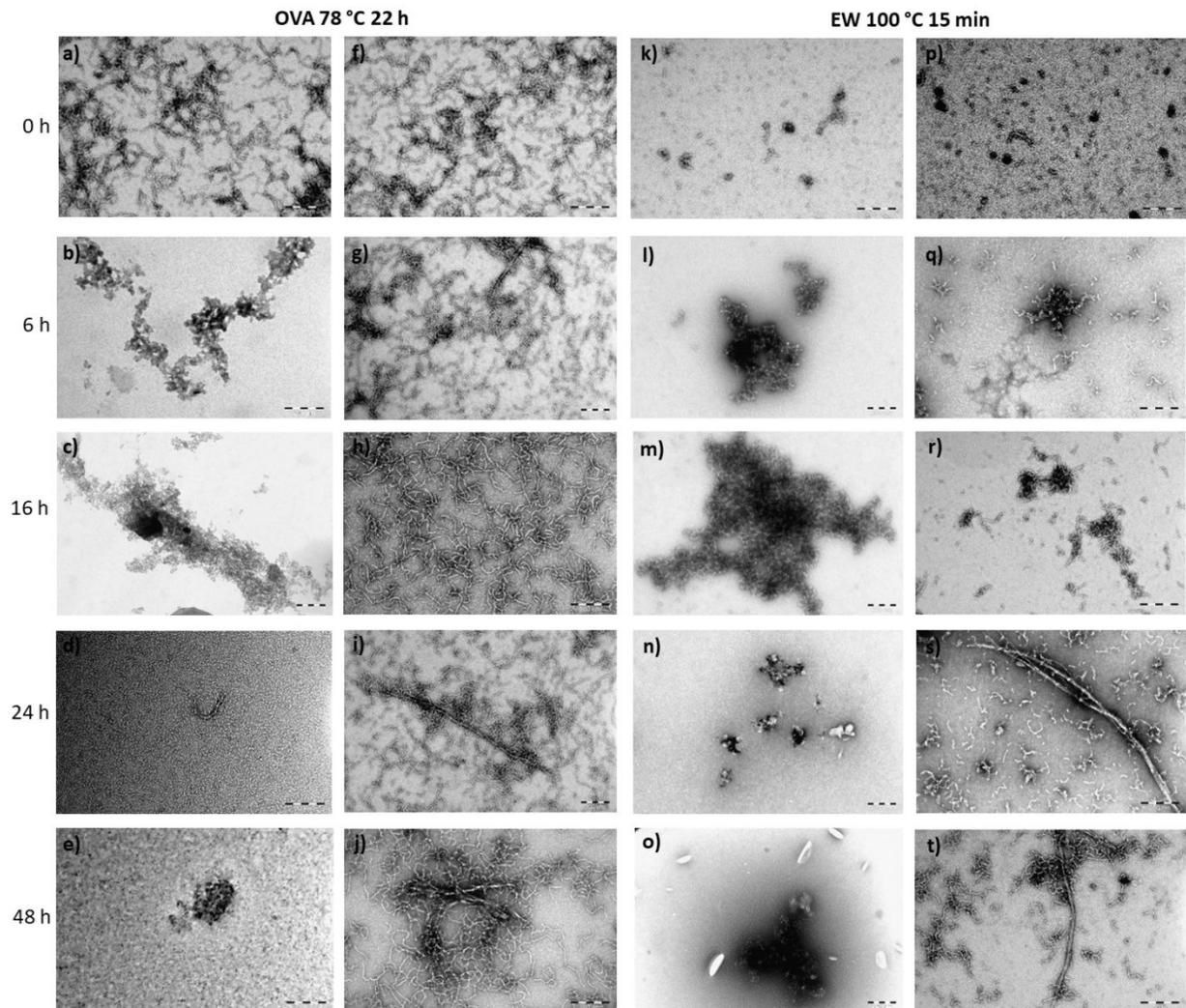


Figure S4. Protein fibril morphology of heated ovalbumin ($OVA_{78/22h}$) and boiled egg white ($EW_{100/15min}$) extracted with proteases. TEM images of $OVA_{78/22h}$ [(a) to (j)] and $EW_{100/15min}$

[(k) to (t)] treated with proteinase K [(a) to (e) and (k) to (o), respectively] trypsin [(f) to (j) and (p) to (t), respectively]. Scale bar: 200 nm.

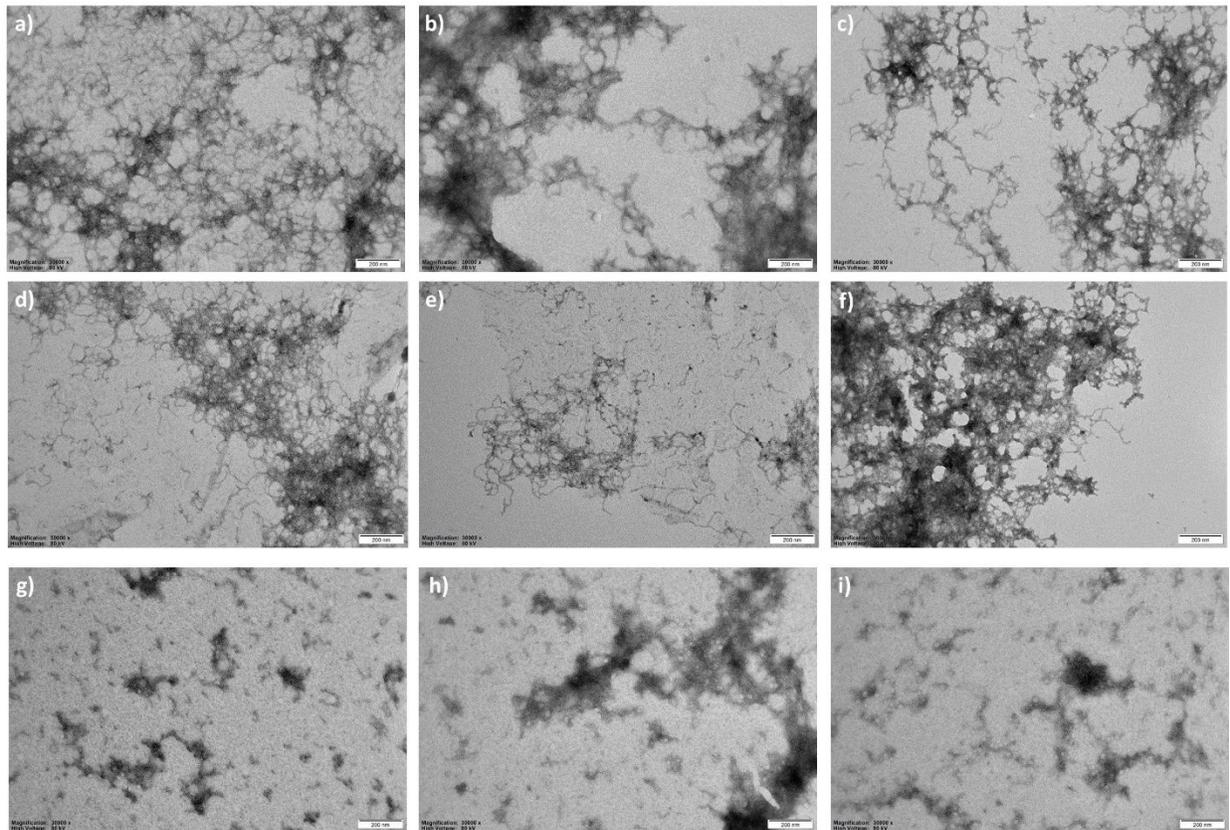


Figure S5. Protein fibril morphology of the SE-HPLC collected peaks after the enzymatic extraction of heated ovalbumin ($OVA_{78/22h}$) and boiled egg white ($EW_{100/15min}$). TEM images of SE-HPLC collected fractions (peak A in Figure 3) of $OVA_{78/22h}$ after shaking without enzymes [(a) to (c)] and of $OVA_{78/22h}$ [(d) to (f)] and $EW_{100/15min}$ [(g) to (i)] treated

with trypsin. Images per row are images from different locations in the same grid. Scale

bar: 200 nm.

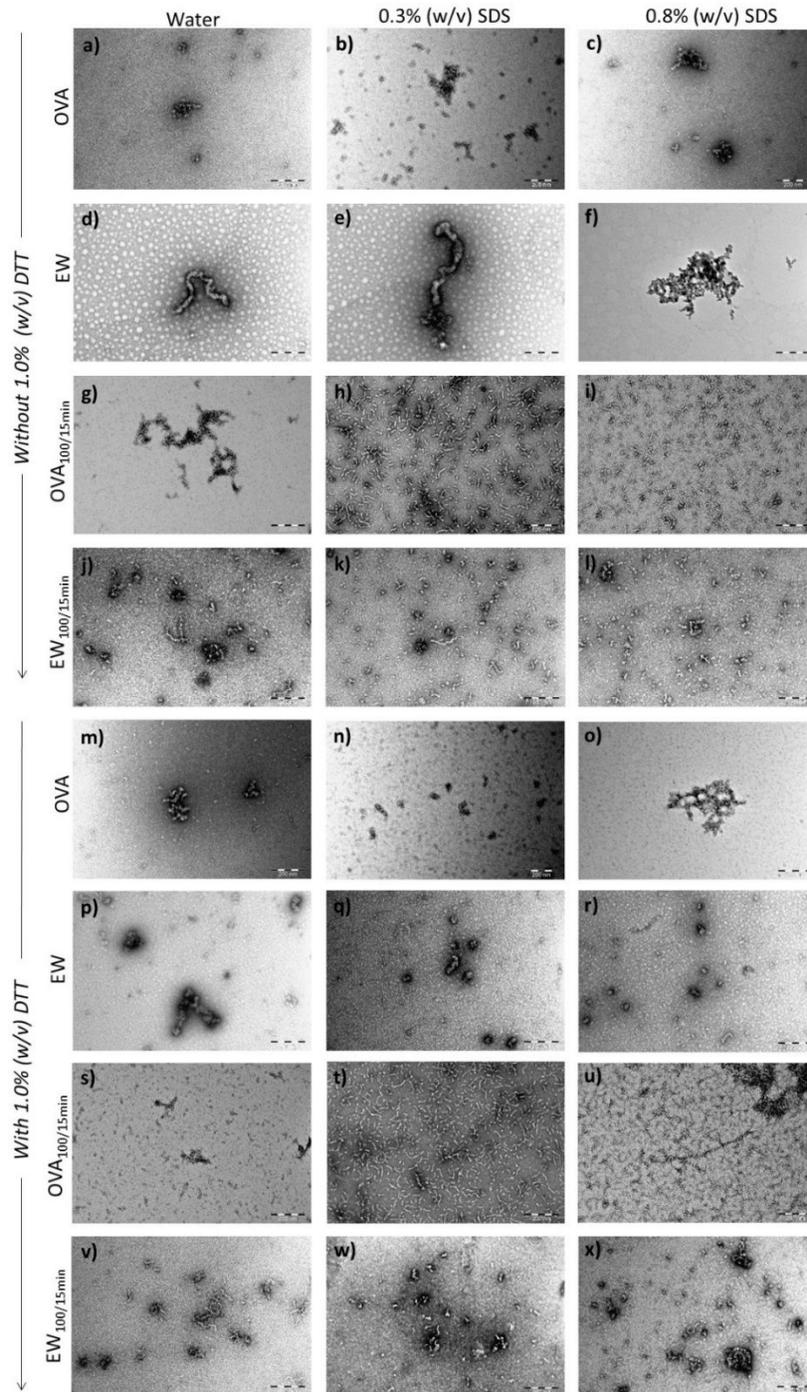


Figure S6. Protein fibril morphology of ovalbumin (OVA) and egg white (EW) unheated or boiled for 15 min ($\text{OVA}_{100/15\text{min}}$ and $\text{EW}_{100/15\text{min}}$) isolated/extracted with sodium dodecyl sulfate (SDS) and 1.0% (w/v) dithiothreitol (DTT). TEM images of unheated OVA [(a) to

(c) and (m) to (o)] and EW [(d) to (f) and (p) to (r)] or OVA_{100/15min} [(g) to (i) and (s) to (u)]
and EW_{100/15min} [(j) to (l) and (r) to (x)] extracted with various concentrations of SDS
without [(a) to (l)] and with 1.0% (w/v) DTT [(m) to (x)].