

**Table S1.** Average FTIR peaks position for control and samples treated with different doses fixed at different times after irradiation; in the first column peak assignments in accordance with Figure 2 are reported. The shifts with respect to the non-irradiated sample for every fixation time, in terms of units of wavenumber are indicated in brackets (red bold values stand for shifts greater than the spectral resolution of the instrument 4 cm<sup>-1</sup>).

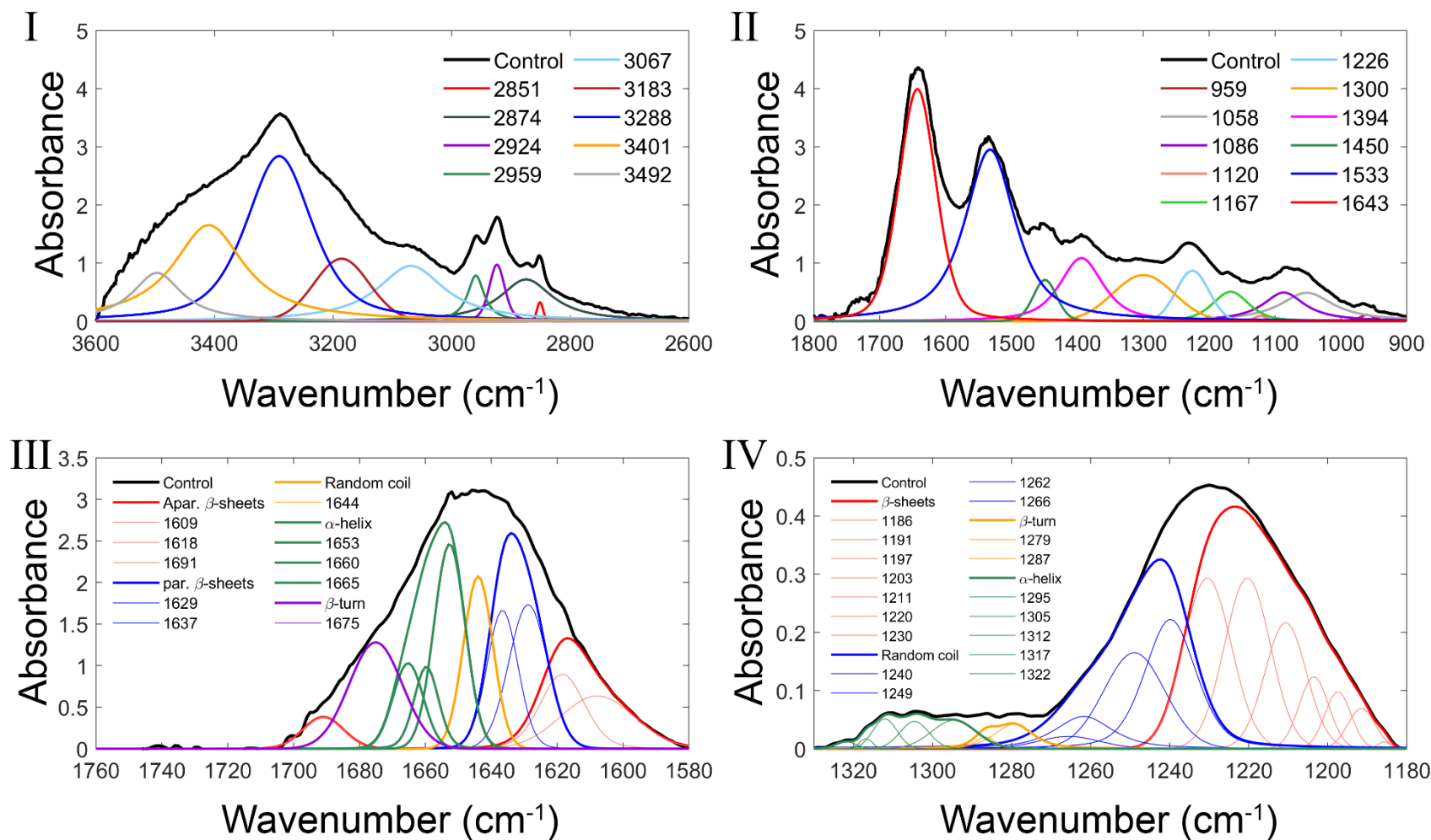
|                    | t0   |           |           |           | t24  |           |           |           | t48  |            |            |            | t72  |            |            |            |
|--------------------|------|-----------|-----------|-----------|------|-----------|-----------|-----------|------|------------|------------|------------|------|------------|------------|------------|
| Dose (Gy)          | 0 Gy | 0.5 Gy    | 2 Gy      | 4 Gy      | 0 Gy | 0.5 Gy    | 2 Gy      | 4 Gy      | 0 Gy | 0.5 Gy     | 2 Gy       | 4 Gy       | 0 Gy | 0.5 Gy     | 2 Gy       | 4 Gy       |
| <b>HWR</b>         |      |           |           |           |      |           |           |           |      |            |            |            |      |            |            |            |
| C <sub>1</sub>     | 3492 | 3496 (+4) | 3493 (+1) | 3498 (+6) | 3496 | 3491 (-5) | 3503 (+8) | 3499 (+3) | 3494 | 3493 (-1)  | 3503 (+9)  | 3502 (+8)  | 3493 | 3497 (+4)  | 3506 (+13) | 3502 (+9)  |
| C <sub>2</sub>     | 3401 | 3397 (-4) | 3396 (-5) | 3398 (-3) | 3394 | 3391 (-3) | 3398 (+4) | 3397 (-4) | 3393 | 3396 (+3)  | 3398 (+5)  | 3400 (+7)  | 3393 | 3396 (+3)  | 3408 (+15) | 3408 (+15) |
| A <sub>1</sub>     | 3288 | 3288      | 3288      | 3287 (-1) | 3290 | 3289 (-1) | 3288 (-2) | 3290      | 3290 | 3291 (+1)  | 3288 (-2)  | 3289 (-1)  | 3289 | 3289       | 3288 (-1)  | 3286 (-3)  |
| P <sub>1</sub>     | 3183 | 3184 (+1) | 3183      | 3184 (+1) | 3189 | 3189      | 3188 (-1) | 3187 (-2) | 3189 | 3185 (-4)  | 3189       | 3188 (-1)  | 3188 | 3187 (-1)  | 3187 (-1)  | 3189 (+1)  |
| A <sub>2</sub>     | 3067 | 3066 (-1) | 3068 (+1) | 3069 (+2) | 3068 | 3065 (-3) | 3069 (+1) | 3068      | 3070 | 3066 (-4)  | 3070       | 3072 (+4)  | 3069 | 3067 (-2)  | 3070 (+1)  | 3076 (+7)  |
| L <sub>1</sub>     | 2959 | 2960 (+1) | 2959      | 2959      | 2959 | 2960 (+1) | 2960 (+1) | 2959      | 2959 | 2961 (+2)  | 2960 (+1)  | 2961 (+2)  | 2959 | 2959       | 2960 (+1)  | 2961 (+2)  |
| L <sub>2</sub>     | 2924 | 2924      | 2924      | 2923 (-1) | 2924 | 2924      | 2923 (-1) | 2924      | 2924 | 2924       | 2925 (+1)  | 2925 (+1)  | 2923 | 2923       | 2924 (+1)  | 2925 (+2)  |
| L <sub>3</sub>     | 2874 | 2873 (-1) | 2874      | 2882 (+8) | 2878 | 2877 (-1) | 2875 (-3) | 2875 (-3) | 2882 | 2878 (-4)  | 2879 (-3)  | 2883 (+1)  | 2881 | 2886 (+5)  | 2874 (-7)  | 2885 (+4)  |
| L <sub>4</sub>     | 2851 | 2852 (+1) | 2851      | 2851      | 2852 | 2852      | 2853 (+1) | 2852      | 2852 | 2853 (+1)  | 2853 (+1)  | 2854 (+2)  | 2852 | 2851 (-1)  | 2852       | 2853 (+1)  |
| <b>FINGERPRINT</b> |      |           |           |           |      |           |           |           |      |            |            |            |      |            |            |            |
| A <sub>3</sub>     | 1643 | 1643      | 1644 (+1) | 1643      | 1642 | 1642      | 1642      | 1642      | 1647 | 1643 (-4)  | 1651 (+4)  | 1649 (+2)  | 1651 | 1644 (-7)  | 1650 (-1)  | 1658 (+7)  |
| A <sub>4</sub>     | 1533 | 1532 (-1) | 1533      | 1535 (+2) | 1532 | 1533 (+1) | 1532      | 1532      | 1535 | 1533 (-2)  | 1536 (+1)  | 1534 (-1)  | 1538 | 1536 (-2)  | 1537 (-1)  | 1538       |
| P <sub>2</sub>     | 1450 | 1452 (+2) | 1452 (+2) | 1451 (+1) | 1450 | 1449 (-1) | 1450      | 1450      | 1453 | 1451 (-2)  | 1452 (-1)  | 1453       | 1450 | 1451 (+1)  | 1455 (+5)  | 1460 (+10) |
| P <sub>3</sub>     | 1394 | 1395 (+1) | 1396 (+2) | 1397 (+3) | 1394 | 1394      | 1392 (-2) | 1395 (+1) | 1397 | 1395 (-2)  | 1396 (-1)  | 1401 (+4)  | 1396 | 1395 (-1)  | 1400 (+4)  | 1403 (+7)  |
| P <sub>4</sub>     | 1300 | 1301 (+1) | 1302 (+2) | 1306 (+6) | 1299 | 1301 (+2) | 1302 (+3) | 1300 (+1) | 1294 | 1302 (+8)  | 1305 (+11) | 1305 (+11) | 1303 | 1304 (+1)  | 1297 (-6)  | 1314 (+11) |
| D <sub>1</sub>     | 1226 | 1230 (+4) | 1232 (+6) | 1231 (+5) | 1227 | 1227      | 1229 (+2) | 1228 (+1) | 1222 | 1230 (+8)  | 1241 (+19) | 1238 (+16) | 1230 | 1226 (-4)  | 1235 (+5)  | 1244 (+14) |
| L <sub>5</sub>     | 1167 | 1172 (+5) | 1170 (+3) | 1164 (-3) | 1169 | 1168 (-1) | 1170 (+1) | 1168 (-1) | 1169 | 1175 (+8)  | 1159 (-10) | 1176 (+9)  | 1166 | 1165 (-2)  | 1160 (-6)  | 1172 (+6)  |
| D <sub>2</sub>     | 1121 | 1122 (+1) | 1123 (+2) | 1124 (+3) | 1119 | 1121 (+2) | 1121 (+2) | 1119      | 1123 | 1120 (-3)  | 1108 (-15) | 1123       | 1128 | 1127 (-1)  | 1117 (-11) | 1129 (+1)  |
| D <sub>3</sub>     | 1085 | 1093 (+8) | 1087 (+2) | 1087 (+2) | 1088 | 1084 (-4) | 1085 (-3) | 1087 (-1) | 1087 | 1084 (-3)  | 1079 (-8)  | 1083 (-4)  | 1086 | 1088 (+2)  | 1086       | 1092 (+6)  |
| D <sub>4</sub>     | 1054 | 1052 (-2) | 1053 (-1) | 1053 (-1) | 1050 | 1049 (-1) | 1046 (-4) | 1049 (-1) | 1062 | 1048 (-14) | 1032 (-30) | 1032 (-30) | 1064 | 1050 (-14) | 1060 (-4)  | 1043 (-21) |
| D <sub>5</sub>     | 959  | 966 (+7)  | 964 (+5)  | 968 (+8)  | 964  | 963 (-1)  | 962 (-2)  | 962 (-2)  | 960  | 964 (+4)   | 953 (-7)   | 955 (-5)   | 963  | 965 (+2)   | 969 (+6)   | 952 (-11)  |

**Table S2.** Amide I deconvolution results for control and irradiated sample fixed at different times after irradiation, with assignments in accordance with the data reported in the literature [58,59]. The ratios between the area of the different subcomponents and the area of the entire Amide III band are reported as a mean value of percentage (A%)  $\pm$  SD.

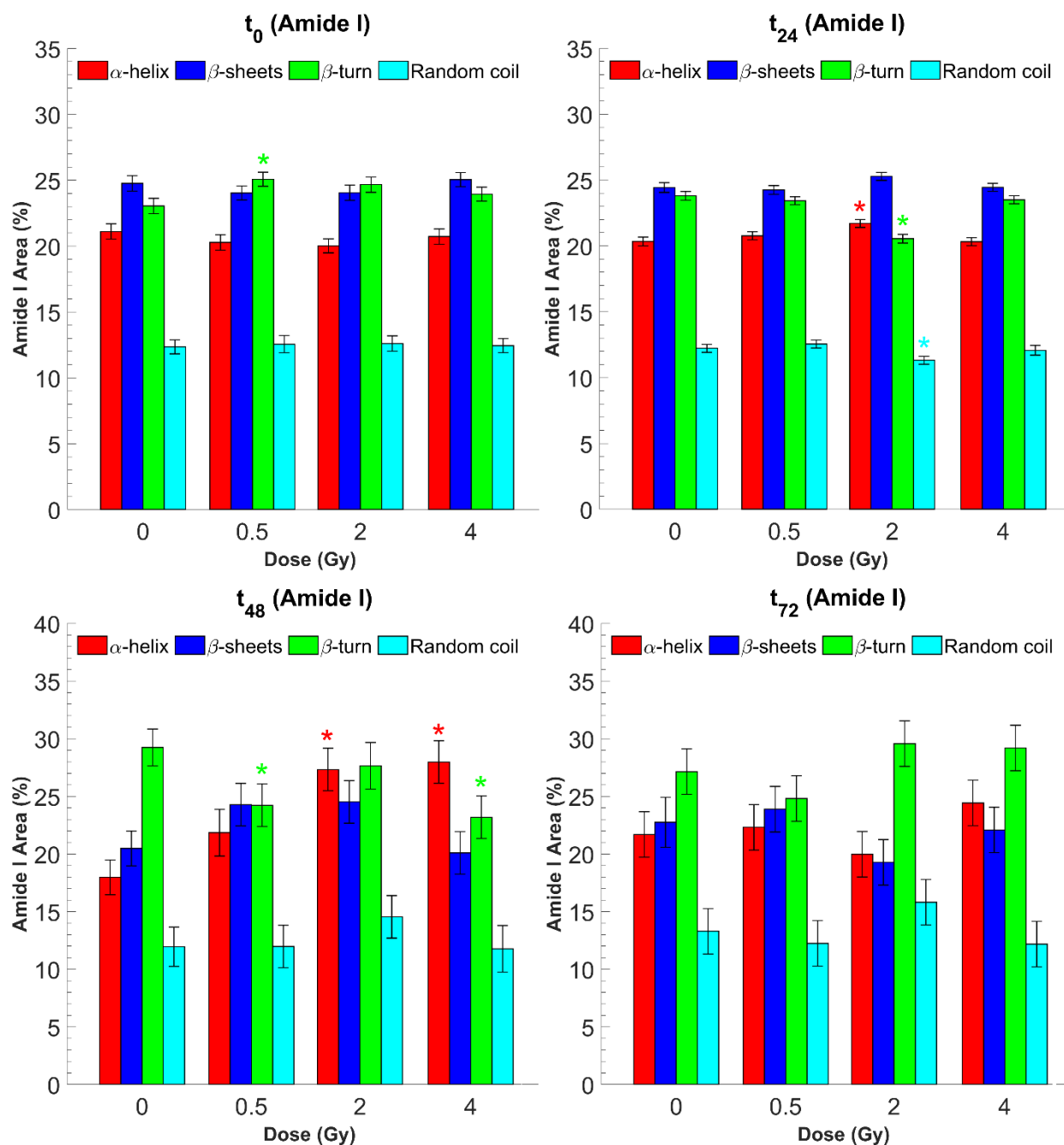
|   | t0                        |                           |                           |                           | t24                       |                           |                           |                           | t48                       |                           |                           |                           | t72                       |                           |                           |                           |
|---|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|
| Assignment<br>s<br>Range (cm <sup>-1</sup> )  | 0 Gy                      | 0.5 Gy                    | 2 Gy                      | 4 Gy                      | 0 Gy                      | 0.5 Gy                    | 2 Gy                      | 4 Gy                      | 0 Gy                      | 0.5 Gy                    | 2 Gy                      | 4 Gy                      | 0 Gy                      | 0.5 Gy                    | 2 Gy                      | 4 Gy                      |
| <b>AMIDE I (1740-1550 cm<sup>-1</sup>)</b>    |                           |                           |                           |                           |                           |                           |                           |                           |                           |                           |                           |                           |                           |                           |                           |                           |
| <b><math>\beta</math>-sheets</b><br>1620-1640 | %A =<br>24.7 $\pm$<br>1.3 | %A =<br>24.0 $\pm$<br>1.2 | %A =<br>24.0 $\pm$<br>1.3 | %A =<br>25.0 $\pm$<br>1.2 | %A =<br>24.4 $\pm$<br>1.4 | %A =<br>24.2 $\pm$<br>1.3 | %A =<br>25.3 $\pm$<br>1.2 | %A =<br>24.4 $\pm$<br>1.2 | %A =<br>20.4 $\pm$<br>1.2 | %A =<br>24.3 $\pm$<br>1.0 | %A =<br>24.5 $\pm$<br>1.2 | %A =<br>20.1 $\pm$<br>1.2 | %A =<br>22.7 $\pm$<br>1.3 | %A =<br>23.9 $\pm$<br>1.2 | %A =<br>19.3 $\pm$<br>1.2 | %A =<br>22.1 $\pm$<br>1.2 |
| <b>Random<br/>coil</b><br>1640-1650           | %A =<br>12.3 $\pm$<br>0.8 | %A =<br>12.6 $\pm$<br>1.0 | %A =<br>12.6 $\pm$<br>0.9 | %A =<br>12.4 $\pm$<br>0.8 | %A =<br>12.2 $\pm$<br>0.8 | %A =<br>12.5 $\pm$<br>0.8 | %A =<br>11.3 $\pm$<br>0.8 | %A =<br>12.1 $\pm$<br>1.0 | %A =<br>11.9 $\pm$<br>0.7 | %A =<br>12.0 $\pm$<br>0.8 | %A =<br>14.5 $\pm$<br>0.8 | %A =<br>11.8 $\pm$<br>0.9 | %A =<br>13.3 $\pm$<br>0.8 | %A =<br>12.2 $\pm$<br>0.8 | %A =<br>15.8 $\pm$<br>0.8 | %A =<br>12.2 $\pm$<br>0.8 |
| <b><math>\beta</math>-turn</b><br>1660-1690   | %A =<br>23 $\pm$ 2        | %A =<br>25 $\pm$ 2        | %A =<br>25 $\pm$ 2        | %A =<br>24 $\pm$ 2        | %A =<br>24 $\pm$ 2        | %A =<br>23 $\pm$ 2        | %A =<br>21 $\pm$ 2        | %A =<br>23 $\pm$ 2        | %A =<br>29.2 $\pm$<br>1.4 | %A =<br>24 $\pm$ 2        | %A =<br>28 $\pm$ 2        | %A =<br>23 $\pm$ 2        | %A =<br>27 $\pm$ 2        | %A =<br>25 $\pm$ 2        | %A =<br>30 $\pm$ 2        | %A =<br>29 $\pm$ 2        |
| <b><math>\alpha</math>-helix</b><br>1650-1660 | %A =<br>21 $\pm$ 2        | %A =<br>20 $\pm$ 2        | %A =<br>20 $\pm$ 2        | %A =<br>21 $\pm$ 2        | %A =<br>20 $\pm$ 2        | %A =<br>21 $\pm$ 2        | %A =<br>22 $\pm$ 2        | %A =<br>20 $\pm$ 2        | %A =<br>18 $\pm$ 2        | %A =<br>22 $\pm$ 2        | %A =<br>27 $\pm$ 2        | %A =<br>28 $\pm$ 2        | %A =<br>22 $\pm$ 2        | %A =<br>22 $\pm$ 2        | %A =<br>20 $\pm$ 2        | %A =<br>24 $\pm$ 2        |

**Table S3.** Amide III deconvolution results for control and irradiated sample fixed at different times after irradiation, with assignments in accordance with the data reported in the literature [39]. The ratios between the area of the different subcomponents and the area of the entire Amide III band are reported as a mean value of percentage (A%)  $\pm$  SD.

|   | t0                 |                    |                    |                    | t24                |                    |                    |                    | t48                |                    |                    |                    | t72                |                    |                    |                    |
|---|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| Assignments<br>Range (cm <sup>-1</sup> )      | 0 Gy               | 0.5 Gy             | 2 Gy               | 4 Gy               | 0 Gy               | 0.5 Gy             | 2 Gy               | 4 Gy               | 0 Gy               | 0.5 Gy             | 2 Gy               | 4 Gy               | 0 Gy               | 0.5 Gy             | 2 Gy               | 4 Gy               |
| <b>AMIDE III (1180-1330 cm<sup>-1</sup>)</b>  |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |
| <b><math>\beta</math>-sheets</b><br>1180-1240 | %A =<br>65 $\pm$ 6 | %A =<br>59 $\pm$ 6 | %A =<br>51 $\pm$ 6 | %A =<br>53 $\pm$ 6 | %A =<br>64 $\pm$ 6 | %A =<br>56 $\pm$ 6 | %A =<br>62 $\pm$ 6 | %A =<br>62 $\pm$ 6 | %A =<br>51 $\pm$ 5 | %A =<br>57 $\pm$ 6 | %A =<br>36 $\pm$ 6 | %A =<br>42 $\pm$ 6 | %A =<br>48 $\pm$ 6 | %A =<br>62 $\pm$ 6 | %A =<br>49 $\pm$ 6 | %A =<br>32 $\pm$ 6 |
| <b>Random coil</b><br>1240-1270               | %A =<br>24 $\pm$ 9 | %A =<br>27 $\pm$ 3 | %A =<br>35 $\pm$ 3 | %A =<br>31 $\pm$ 3 | %A =<br>20 $\pm$ 3 | %A =<br>28 $\pm$ 3 | %A =<br>29 $\pm$ 3 | %A =<br>23 $\pm$ 3 | %A =<br>19 $\pm$ 2 | %A =<br>31 $\pm$ 3 | %A =<br>30 $\pm$ 3 | %A =<br>43 $\pm$ 3 | %A =<br>16 $\pm$ 3 | %A =<br>23 $\pm$ 3 | %A =<br>29 $\pm$ 3 | %A =<br>44 $\pm$ 3 |
| <b><math>\beta</math>-turn</b><br>1270-1290   | %A =<br>4 $\pm$ 3  | %A =<br>5 $\pm$ 3  | %A =<br>6 $\pm$ 3  | %A =<br>7 $\pm$ 3  | %A =<br>6 $\pm$ 3  | %A =<br>5 $\pm$ 3  | %A =<br>2 $\pm$ 3  | %A =<br>6 $\pm$ 3  | %A =<br>9 $\pm$ 2  | %A =<br>4 $\pm$ 3  | %A =<br>15 $\pm$ 3 | %A =<br>6 $\pm$ 3  | %A =<br>18 $\pm$ 3 | %A =<br>4 $\pm$ 3  | %A =<br>11 $\pm$ 3 | %A =<br>10 $\pm$ 3 |
| <b><math>\alpha</math>-helix</b><br>1290-1330 | %A =<br>7 $\pm$ 2  | %A =<br>9 $\pm$ 3  | %A =<br>10 $\pm$ 2 | %A =<br>9 $\pm$ 3  | %A =<br>8 $\pm$ 2  | %A =<br>9 $\pm$ 3  | %A =<br>5 $\pm$ 3  | %A =<br>9 $\pm$ 2  | %A =<br>17 $\pm$ 2 | %A =<br>9 $\pm$ 2  | %A =<br>19 $\pm$ 2 | %A =<br>13 $\pm$ 2 | %A =<br>18 $\pm$ 2 | %A =<br>9 $\pm$ 2  | %A =<br>12 $\pm$ 2 | %A =<br>14 $\pm$ 2 |



**Figure S1.** Deconvolution of average control spectra (I) in the high wavenumber region (3600–2600  $\text{cm}^{-1}$ ), (II) in the fingerprint region (1800–900  $\text{cm}^{-1}$ ), (III) in the Amide I band region (1760–1580  $\text{cm}^{-1}$ ) and (IV) in the Amide III band region (1320–1180  $\text{cm}^{-1}$ ); for the analysis of the Amide I and Amide III peaks a further piece-wise baseline subtraction within the spectral range of interest was performed before deconvolution.



**Figure S2.** Variations of secondary protein structure contributions to Amide I band ( $1740\text{--}1550\text{ cm}^{-1}$ ) with dose, for cells fixed immediately and 24h, 48h and 72 h after irradiation; the ratios between the secondary structure peak areas and the area of the entire Amide I peak are reported as Mean  $\pm$  SD. Asterisks indicate when a significant difference with respect to the corresponding control value occurred at  $p \leq 0.05$ .