**Supplementary data**

Table S1

FTIR spectral peaks for collagen under ambient laboratory conditions

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Amide A** | **Amide B** | **Amide I** | **Amide II** | **Amide III** | $$(A\_{III}/A\_{1450})$$ |
| Col-A-0 | 3298 | 3076 | 1631 | 1541 | 1236 | 1.02 |
| Col-A-2m | 3296 | 3074 | 1631 | 1540 | 1236 | 1.02 |
| Col-A-4m | 3294 | 3076 | 1631 | 1546 | 1236 | 1.00 |
| Col-A-6m | 3294 | 3078 | 1629 | 1545 | 1236 | 1.00 |
| Col-A-12m | 3294 | 3078 | 1629 | 1545 | 1236 | 1.00 |

Table S2

Mechanical parameters obtained for collagen under ambient laboratory conditions (\*\*\*p < 0.05, as compared to Col-A-0).

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Tensile strength (MPa) \*\*\*** | **Strain at failure (%)\*\*\*** | $E\_{max}$ **(MPa) \*\*\*** | $E\_{II}$ **(MPa) \*\*\*** | **Toughness (MJ/m3) \*\*\*** |
| Col-A-0 | 75.7 ± 15.7 | 23.5 ± 2.5 | 1172 ± 194 | 273 ± 33 | 1022 ± 309.2 |
| Col-A-2m | 69.5 ± 7.8 | 20.5 ± 2.2 | 1105 ± 152 | 268 ± 21 | 841.8 ± 189.3 |
| Col-A-4m | 65.5 ± 5.3 | 17.7 ± 2.1 | 1290 ± 182 | 270 ± 28 | 746.3 ± 156.2 |
| Col-A-6m | 77.1 ± 10.7 | 16.1 ± 2.8 | 1572 ± 236 | 354 ± 36 | 759.6 ± 241.5 |
| Col-A-12m | 80.0 ± 9.8 | 15.2 ± 3.0 | 1588 ± 201 | 360 ± 40 | 757.1 ± 211.3 |

Table S3

Effect of *in-aqua* condition on FTIR spectral peaks of specimen

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Amide A** | **Amide B** | **Amide I** $(v\_{1})$ | **Amide II** $(v\_{2})$ | **Amide III** | $$(A\_{III}/A\_{1450})$$ | $(∆v)$ **(cm-1)** |
| *Col-A-0* | *3298* | *3076* | *1631* | *1541* | *1236* | *1.02* | *90* |
| Col-B-1d | 3298 | 3078 | 1636 | 1541 | 1238 | 0.98 | 95 |
| Col-B-3d | 3288 | 3076 | 1636 | 1541 | 1238 | 0.99 | 95 |
| Col-B-7d | 3288 | 3075 | 1635 | 1541 | 1238 | 0.98 | 94 |
| Col-B-10d | 3294 | 3078 | 1633 | 1541 | 1236 | 0.98 | 92 |
| Col-B-14d | 3292 | 3076 | 1633 | 1539 | 1236 | 0.98 | 94 |

*Col-A-0* is used as a reference.

Table S4

Effect of water-induced degradation mechanical parameters obtained for collagen film demonstrating significant variation when compared against Col-B-1d (\*\*\*p < 0.05) (except for those denoted with \* representing statistical insignificance).

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Tensile strength (MPa) \*\*\*** | **Strain at failure (%) \*\*\*** | $E\_{I}$ **(MPa) \*\*\*** | $E\_{III}$ **(MPa)\*\*\*** | **Toughness (MJ/m3)\*\*\*** |
| Col-B-1d | 1.42 ± 0.58 | 53.7 ± 3.5 | 0.92 ± 0.65 | 4.35 ± 0.56 | 27.4 ± 7.5 |
| Col-B-3d | 2.12 ± 0.72  | 59 ± 3.6  | 0.85 ± 0.24 **\*** | 6.65 ± 0.78  | 38.7 ± 10.2  |
| Col-B-7d | 1.09 ± 0.6  | 50.1 ± 3.2 **\*** | 0.83 ± 0.36  | 4.46 ± 0.67 **\*** | 17.5 ± 8.2 |
| Col-B-10d | 0.52 ± 0.23 | 40.8 ± 2.8  | 0.68 ± 0.21  | 2.71 ± 0.32  | 7.7 ± 4.6 |
| Col-B-14d | - | - | - | - | - |

Table S5

Mechanical parameters obtained for collagen films dried after exposure to water demonstrating statistically significant changes compared to Col-A-0 (\*\*\*p < 0.05).

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Tensile strength (MPa) \*\*\*** | **Strain at failure (%)\*\*\*** | $E\_{max}$ **(MPa) \*\*\*** | $E\_{II}$ **(MPa) \*\*\*** | **Toughness (MJ/m3) \*\*\*** |
| *Col-A-0* | *75.7 ± 15.7* | *23.5 ± 2.5* | *1172 ± 194* | *273 ± 33* | *1022 ± 309.2* |
| Col-C-1d | 52.18 ± 8.53 | 19.96 ± 2.1 | 960.8 ± 178.1 | 215.8 ± 25.3 | 604.7 ± 155.2 |
| Col-C-3d | 55.41 ± 9.68 | 20.80 ± 2.5 | 925.7 ± 173.8 | 238.5 ± 29.2 | 635.1 ± 188.6 |
| Col-C-7d | 50.28 ± 7.21 | 19.05 ± 1.9 | 853.2 ± 168.5 | 223.1 ± 26.5 | 545.5 ± 132.3 |
| Col-C-10d | 45.52 ± 7.25 | 16.25 ± 1.5 | 848.1 ± 169.2 | 244.2 ± 23.2 | 417.8 ± 127.2 |
| Col-C-14d | 29.83 ± 5.68 | 12.54 ± 1.8 | 862.5 ± 123.2 | 172.1 ± 20.4 | 197.5 ± 68.6 |