

Supplementary Information for the following article:

***In-situ* development of self-defensive antibacterial biomaterials: phenol-g-keratin-EC based bio-composites with characteristics for biomedical applications**

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This is the supplementary information for the article, 'In-situ development of self-defensive antibacterial biomaterials: phenol-g-keratin-EC based bio-composites with characteristics for biomedical applications' published in Green Chemistry (2015), [doi:10.1039/C5GC00715A](https://doi.org/10.1039/C5GC00715A).

The published version of the article is available at:

<http://pubs.rsc.org/en/content/articlelanding/2015/gc/c5gc00715a#!divAbstract>

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***In-situ* development of self-defensive antibacterial biomaterials: phenol-g-keratin-EC based bio-composites with characteristics for biomedical applications**

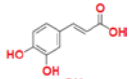
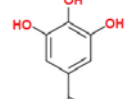
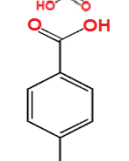
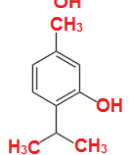
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⁵ Received (in XXX, XXX) Xth XXXXXXXXXX 20XX, Accepted Xth XXXXXXXXXX 20XX

DOI: 10.1039/b000000x

Supplementary Information

¹⁰ **Table S1** Physiochemical characteristics of natural phenols used in this study for grafting purposes using laccase as a model catalyst.

| Natural phenols | Appearance | Molecular formula | Molecular mass (g/mol) | Density (g/cm ³) | Melting point (°C) | Functional groups | Structure |
|---------------------------------|------------------------------|--|------------------------|------------------------------|--------------------|-------------------------|---|
| Caffeic acid | Yellow solid | C ₉ H ₈ O ₄ | 180.16 | 1.478 | 223 to 225 | Hydroxyl and carboxylic |  |
| Gallic acid | White or yellow-white powder | C ₆ H ₂ (OH) ₃ COOH | 170.12 | 1.694 | 260 | Hydroxyl and carboxylic |  |
| <i>p</i> -4-Hydroxybenzoic acid | White crystalline | C ₇ H ₆ O ₃ | 138.121 | 1.46 | 214.5 | Hydroxyl and carboxylic |  |
| Thymol | White crystalline | C ₁₀ H ₁₄ O | 150.22 | 0.96 | 49-51 | Hydroxyl |  |

¹⁵ **Table S2** Analysis of variance of the data on grafting parameters *i.e.*, graft yield, grafting efficiency and swelling ratio behaviours of CA, keratin-EC and CA-g-keratin-EC bio-composites.

| Source | DF | Seq. SS | Adj. SS | Adj. MS | F-value | P-value |
|--------|----|---------|---------|---------|---------|---------------|
| Treat | 2 | 469300 | 469300 | 234650 | 46.31 | 0.003* |
| Block | 4 | 32149 | 32149 | 8037 | - | - |
| Error | 8 | 40532 | 40532 | 5067 | - | - |
| Total | 14 | 541981 | - | - | - | - |

* = Significant

Table S3 Analysis of variance of the data on grafting parameters *i.e.*, graft yield, grafting efficiency and swelling ratio behaviours of GA, keratin-EC and GA-g-keratin-EC bio-composites.

| Source | DF | Seq. SS | Adj. SS | Adj. MS | F-value | P-value |
|--------|----|---------|---------|---------|---------|---------------|
| Treat | 2 | 377518 | 377518 | 188759 | 29.14 | 0.008* |
| Block | 4 | 37953 | 37953 | 9488 | - | - |
| Error | 8 | 51827 | 51827 | 6478 | - | - |
| Total | 14 | 467297 | - | - | - | - |

* = Significant

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Table S4 Analysis of variance of the data on grafting parameters *i.e.*, graft yield, grafting efficiency and swelling ratio behaviours of HBA, keratin-EC and HBA-g-keratin-EC bio-composites.

| Source | DF | Seq. SS | Adj. SS | Adj. MS | F-value | P-value |
|--------|----|---------|---------|---------|---------|---------------|
| Treat | 2 | 353162 | 353162 | 176581 | 44.12 | 0.007* |
| Block | 4 | 28788 | 28788 | 7197 | - | - |
| Error | 8 | 32017 | 32017 | 4002 | - | - |
| Total | 14 | 413967 | - | - | - | - |

* = Significant

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Table S5 Analysis of variance of the data on grafting parameters *i.e.*, graft yield, grafting efficiency and swelling ratio behaviours of T, keratin-EC and T-g-keratin-EC bio-composites.

| Source | DF | Seq. SS | Adj. SS | Adj. MS | F-value | P-value |
|--------|----|---------|---------|---------|---------|---------------|
| Treat | 2 | 209504 | 209504 | 104752 | 89.53 | 0.010* |
| Block | 4 | 11743 | 11743 | 2936 | - | - |
| Error | 8 | 9361 | 9361 | 1170 | - | - |
| Total | 14 | 230608 | - | - | - | - |

* = Significant

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Table S6 Analysis of variance of the data on the cell viability of HaCaT seeded on the selected bio-composites for prescribed periods.

| Source | DF | Seq. SS | Adj. SS | Adj. MS | F-value | P-value |
|--------|----|---------|---------|---------|---------|---------------|
| Treat | 2 | 7814.1 | 7814.1 | 3907.1 | 21.45 | 0.001* |
| Block | 5 | 2889.6 | 2889.6 | 577.9 | - | - |
| Error | 10 | 1821.2 | 1821.2 | 182.1 | - | - |
| Total | 17 | 12524.9 | - | - | - | - |

* = Significant

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Table S7 Analysis of variance of the data on the biodegradability of the selected bio-composites buried for prescribed periods.

| Source | DF | Seq. SS | Adj. SS | Adj. MS | F-value | P-value |
|--------|----|---------|---------|---------|---------|---------------|
| Treat | 4 | 1180.2 | 1180.2 | 295.0 | 13.68 | 0.002* |
| Block | 5 | 19545.1 | 19545.1 | 3909.0 | - | - |
| Error | 20 | 431.4 | 431.4 | 21.6 | - | - |
| Total | 29 | 21156.7 | - | - | - | - |

* = Significant