Electronic Supplementary Material (ESI) for Materials Advances.


# Boron nitride embedded in chitosan hydrogel as hydrophobic, promising metal-free, sustainable antibacterial materials

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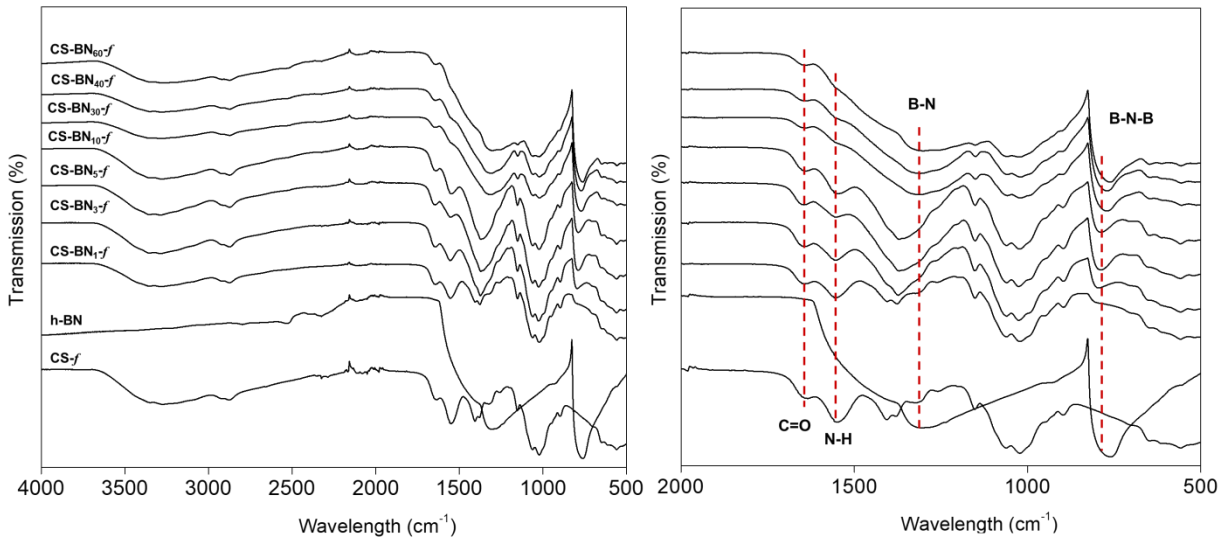
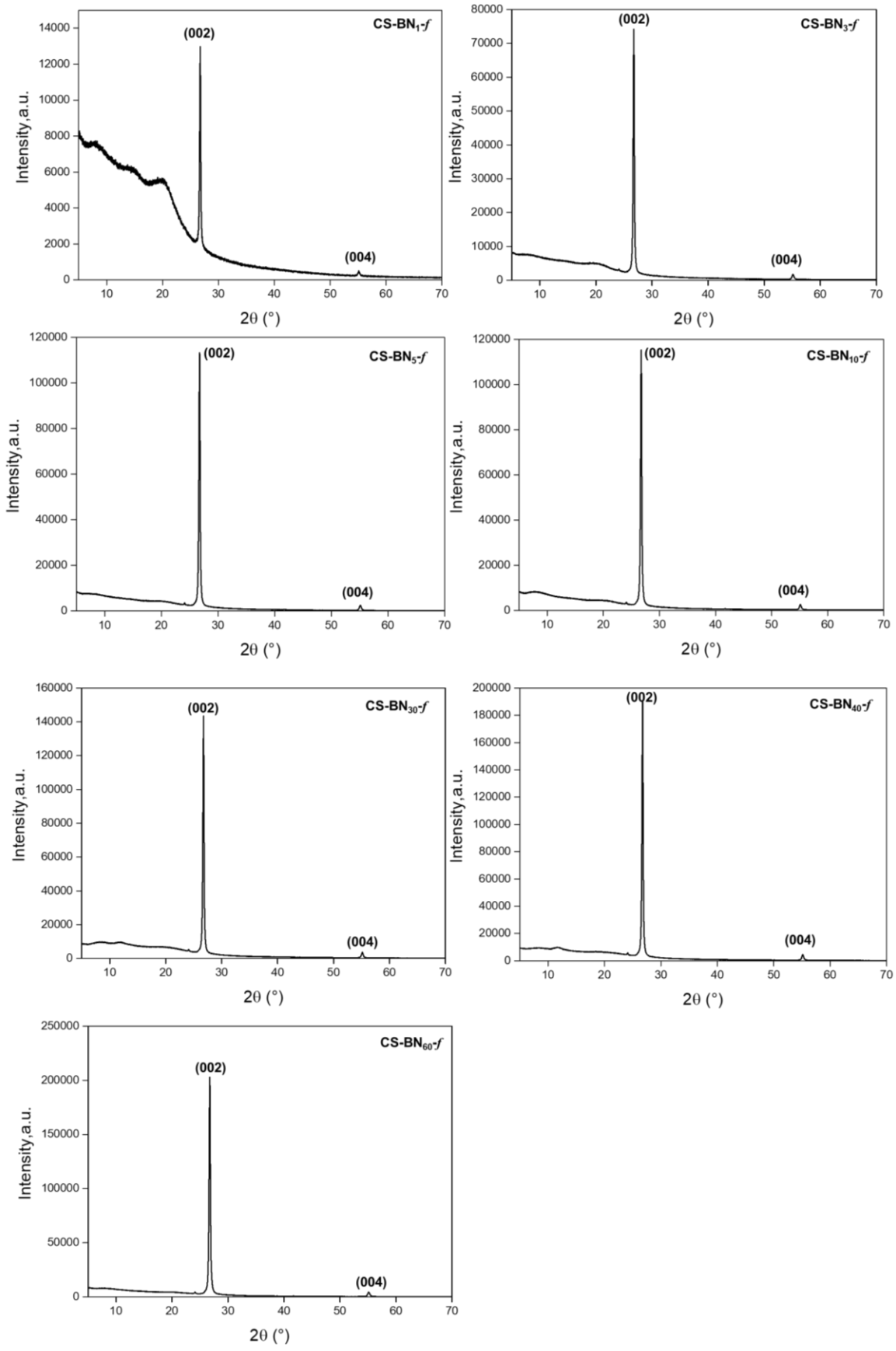
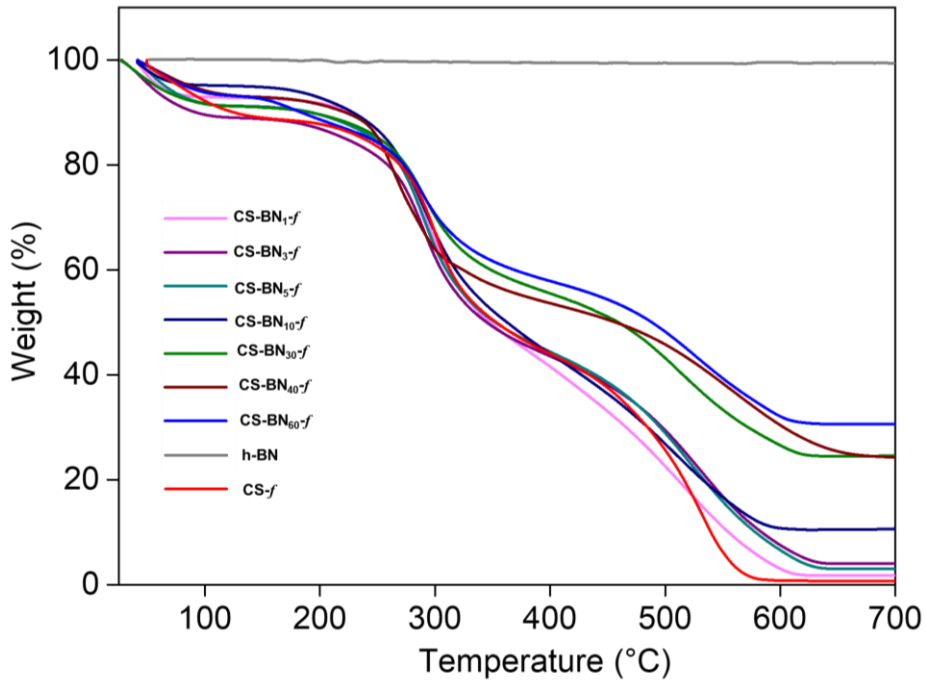
## S1. DRIFT spectra obtained for CS-BN$_x$-*f* films



## S2. XRD diffractograms obtained for CS-BN$_x$-*f* films

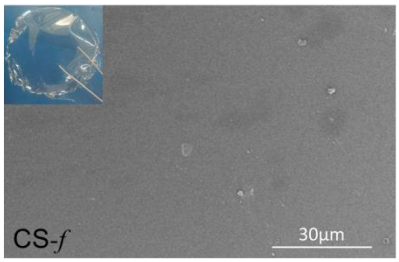


## S3. TGA analysis curves obtained for CS-$BN_x$-*f* films under air

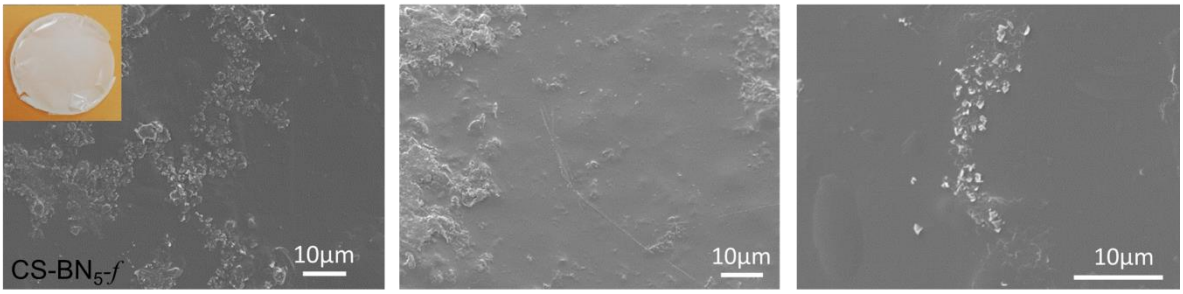


## S4. SEM and element Mapping images obtained for CS-$BN_x$-*f* films

a)




b)



## S5. Chemical properties of the synthesized materials

Table S5: Chemical properties of the synthesized materials

| Sample | Thickness ( | Water contact angle (°) | Residual mass (%) |
|---|---|---|---|
| CS-*f* | | 67.4 ± 2.34 | 0 |
| h-BN | | | 100 |
| CS-$BN_1$-*f* | 6 | 80.0 ± 5.05 | 1.54 |
| CS-$BN_3$-*f* | 10 | 87.7 ± 4.36 | 2.5 |
| CS-$BN_5$-*f* | 10 | 87.2 ± 4.05 | 3 |
| CS-$BN_{10}$-*f* | 13 | 83.8 ± 3.41 | 10 |
| CS-$BN_{30}$-*f* | 16 | 96.2 ± 1.93 | 24 |
| CS-$BN_{40}$-*f* | 20 | 99.7 ± 2.23 | 25 |
| CS-$BN_{60}$-*f* | 23 | 102.9 ± 2.42 | 30 |

## S6. Tensile strength comparison of some polymer-boron nitride composites

Table S6: Tensile strength comparison of some polymer-boron nitride composites

| Material | h-BN loading (%) | Tensile strength (MPa) | Application | REF |
|---|---|---|---|---|
| **CS-$BN_x$-*f*** | 30 | 119 | Antibacterial | This work |
| **CNF/BAH-$NH_2$** | 50 | 35.93 | - | [1] |
| **Cellulose/BNN-OH** | 50 | 226 | - | [2] |
| **CNF/BNNOH** | 60 | 45 | - | [3] |
| **Chitin/BNNs** | 10 | 85 | Dielectric energy storage. | [4] |
| **CS-5** | 5 | 91 | Cell viability | [5] |
| **PDMC/BNNSs** | 1 | 70 | - | [6] |
| **CNF/f-BNNS** | 70 | 66 | Electronic devices | [7] |
| **FBN/PVA** | 60 | 112 | Thermal management in electronics | [8] |
| **BNNPs/NFC** | 40 | 74.6 | Absorption and separation of MG and rhodamine B dyes. | [9] |
| **f-BNNS/PVA** | 5 | ~11.37 | Portable electronics | [10] |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