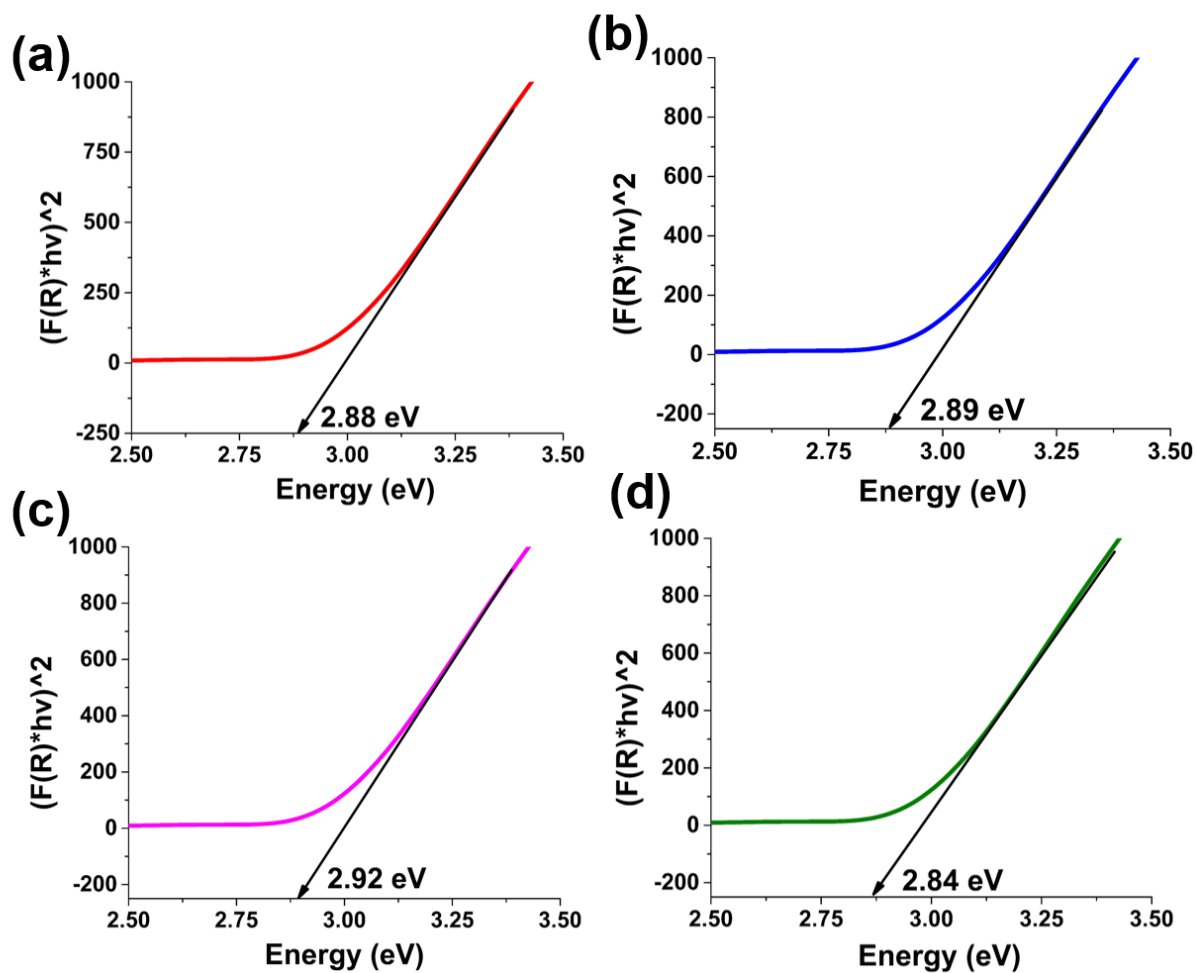
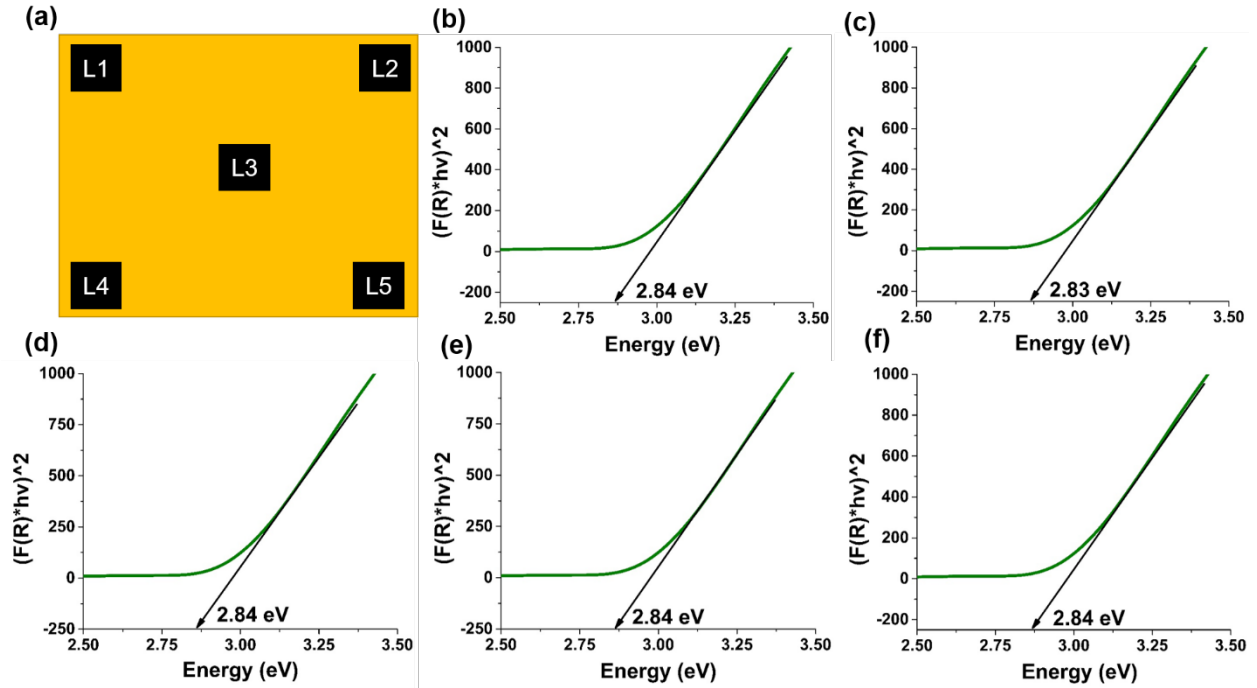


Supplementary Data File 01



Supplementary data file 01: Band gap energy of; (a) Ag doped SiNP, (b) Cu doped SiNP, (c) Co doped SiNP and (d) Trimetallic silica nanohybrid of Ag+Cu+Co+SiNP incorporated cellulose acetate nanofiber mat.

Supplementary Data File 02



Supplementary data file 02: (a) Different places of the trimetallic silica nanohybrid incorporated nanofiber mat which were used for the analysis, Band gap energies of; (b) Point 'L1', (c) Point 'L2', (d) Point 'L3', (e) Point 'L4', and (f) Point 'L5'.

Supplementary Data File 03

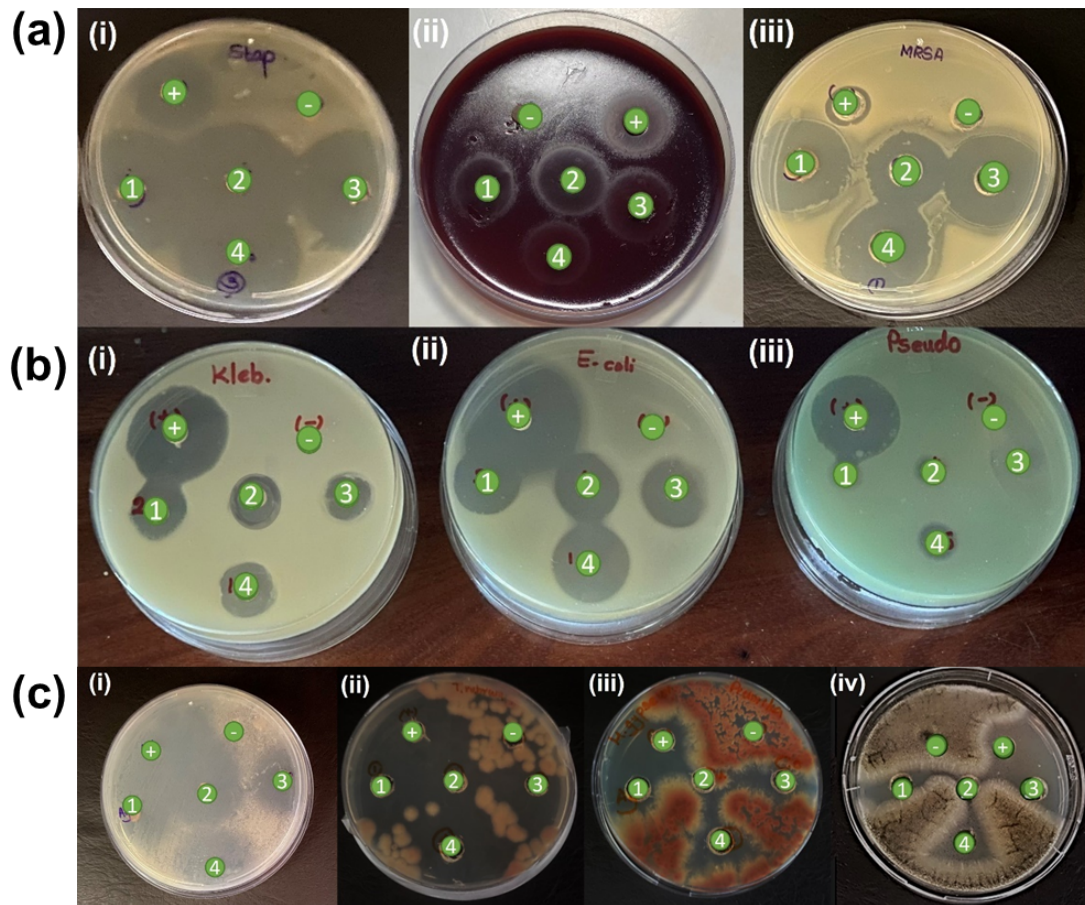


Fig: Zones of inhibition of (a) Gram positive bacteria; (i) *Staphylococcus aureus*, (ii) *Streptococcus pneumonia*, (iii) MRSA; (b) Gram negative bacteria; (i) *Klebsiella pneumoniae*, (ii) *Escherichia coli*, (iii) *Pseudomonas aeruginosa*; (c) Fungi; (i) *Candida albicans* (ii) *Trichophyton rubrum*, (iii) *Microsporium gypseum* and (iv) *Aspergillus niger* (+) Positive control, (-) Negative control, (1) Ag – Si – CA - mat, (2) Cu – Si – CA - mat, (3) Co – Si – CA - mat and (4) Ag – Si + Cu - Si + Co - Si – CA -mat.

Table: Zones of inhibition of metallic silica nanohybrids incorporated nanofiber mats against ATCC cultures of all the test strains.

| Type of the nanofiber mat/ Standard antibiotic | Zone of inhibition (mm) | | | | | | | | | |
|---|-------------------------|----------------------|------------|---------------|----------------------|----------------------|--------------------|------------------|--------------------|-----------------|
| | <i>S. aureus</i> | <i>S. pneumoniae</i> | MRSA | <i>E.coli</i> | <i>K. pneumoniae</i> | <i>P. aeruginosa</i> | <i>C. albicans</i> | <i>T. rubrum</i> | <i>M. gypsiu</i> m | <i>A. niger</i> |
| Positive control | 32.67±0.58 | 22.00±0.00 | 22.00±0.00 | 30.00±0.00 | 22.67±0.58 | 22.67±0.58 | 32.33±0.58 | 23.67±0.58 | 20.67±0.58 | 20.00±0.00 |
| Negative control | 0.00±0.00 | 0.00±0.00 | 0.00±0.00 | 0.00±0.00 | 0.00±0.00 | 0.00±0.00 | 0.00±0.00 | 0.00±0.00 | 0.00±0.00 | 0.00±0.00 |
| 1 | 20.67±0.58 | 21.00±0.00 | 25.33±0.58 | 14.00±1.73 | 13.33±0.58 | 9.33±0.58 | 25.67±0.58 | 16.00±2.00 | 13.33±0.58 | 12.33±0.58 |
| 2 | 19.33±0.58 | 19.67±0.58 | 24.00±1.00 | 12.67±1.15 | 11.33±0.58 | 8.00±0.00 | 23.67±0.58 | 14.00±0.00 | 11.67±0.58 | 11.00±0.00 |
| 3 | 16.33±0.58 | 16.33±0.58 | 21.00±0.00 | 10.67±0.58 | 9.33±0.58 | 7.00±0.00 | 21.67±0.58 | 12.00±0.00 | 10.33±0.58 | 9.67±0.58 |
| 4 | 22.33±0.58 | 22.33±0.58 | 28.33±0.58 | 16.33±0.58 | 15.00±0.00 | 11.33±0.58 | 30.00±0.58 | 21.67±0.58 | 16.00±0.00 | 16.00±0.00 |

(1) Ag – Si – CA - mat, (2) Cu – Si – CA - mat, (3) Co – Si – CA - mat and (4) Ag – Si + Cu - Si + Co - Si – CA -mat.

Supplementary Data File 04

Table: *p* values for each comparison of mean values of inhibition zones values of different metallic silica nanohybrids incorporated nanofiber mats using two sample T test

| The significance difference between; | <i>p</i> value | | | | | | | | | | The mean values are significantly different |
|--------------------------------------|-----------------|----------------------|--------|---------------|----------------------|----------------------|--------------------|------------------|-------------------|-----------------|---|
| | <i>S.aureus</i> | <i>S. pneumoniae</i> | MRSA | <i>E.coli</i> | <i>K. pneumoniae</i> | <i>P. aeruginosa</i> | <i>C. albicans</i> | <i>T. rubrum</i> | <i>M. gypseum</i> | <i>A. niger</i> | |
| 1 | 0.0001 | 0.0086 | 0.0002 | 0.0090 | 0.0005 | 0.0008 | 0.0005 | 0.0092 | 0.0161 | 0.0021 | Yes |
| 2 | 0.0001 | 0.0072 | 0.0001 | 0.0091 | 0.0004 | 0.0007 | 0.0001 | 0.0003 | 0.0060 | 0.0008 | Yes |
| 3 | 0.0010 | 0.0061 | 0.0002 | 0.0086 | 0.0005 | 0.0007 | 0.0001 | 0.0001 | 0.0010 | 0.0002 | Yes |

(1) Ag – Si – CA - mat and Ag – Si + Cu - Si + Co - Si – CA -mat (***), (2) Cu – Si – CA - mat and Ag – Si + Cu - Si + Co - Si – CA -mat (***) and (3)) Co – Si – CA - mat and Ag – Si + Cu - Si + Co - Si – CA -mat (*).

Supplementary Data File 05

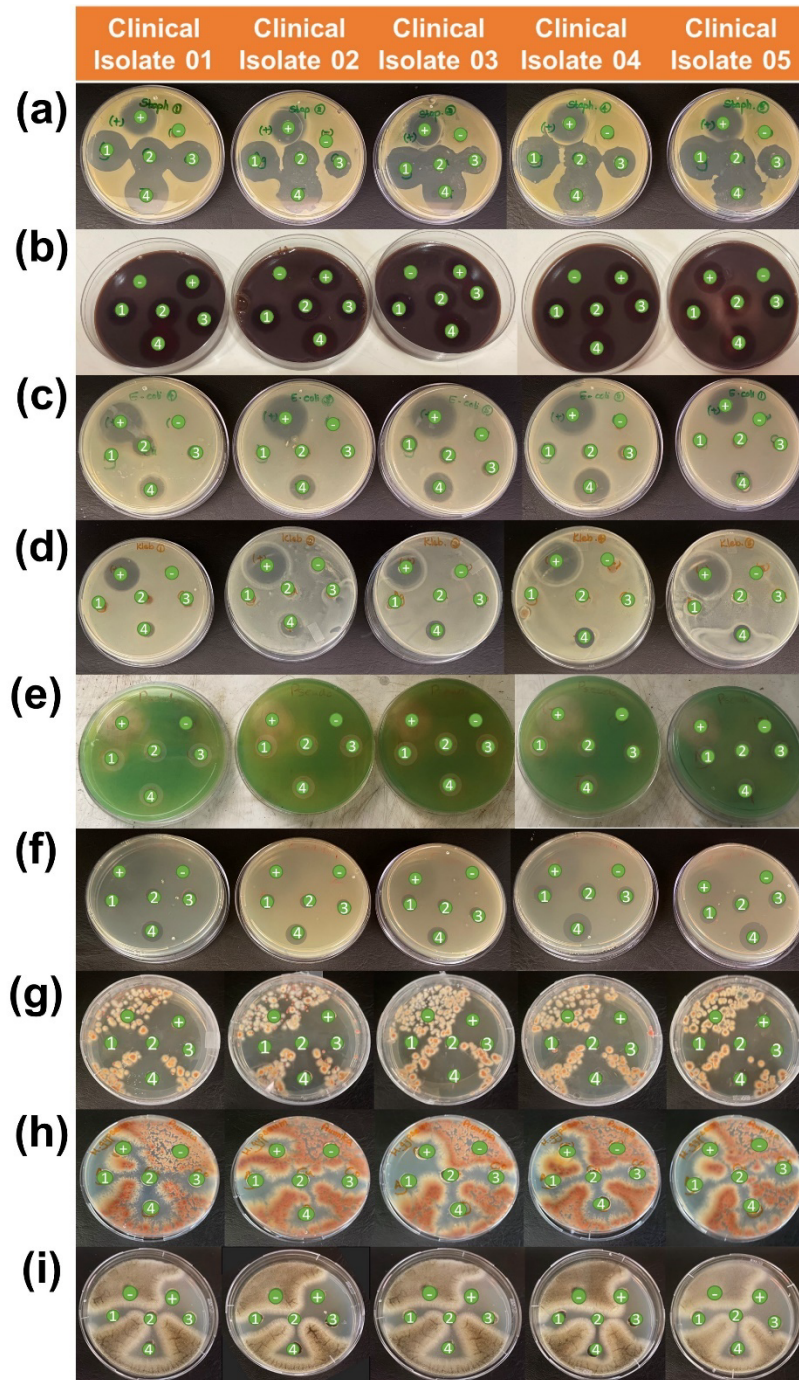


Fig: Zones of inhibition of gram positive bacteria; (a) *Staphylococcus aureus*, (b) *Streptococcus pneumoniae*, gram negative bacteria; (c) *Klebsiella pneumoniae*, (d) *Escherichia coli*, (e) *Pseudomonas aeruginosa*; fungi; (f) *Candida albicans* (g) *Trichophyton rubrum*, (h) *Microsporium gypseum* and (i) *Aspergillus niger* (+) Positive control, (-) Negative control, (1) Ag - Si - CA - mat, (2) Cu - Si - CA - mat, (3) Co - Si - CA - mat and (4) Ag - Si + Cu - Si + Co - Si - CA -mat

Table: Zones of inhibition of metallic silica nanohybrids incorporated nanofiber mats against clinical isolates of previously tested ATCC cultures of all the test strains of bacteria

| | <i>Staphylococcus sp.</i> | | | | | <i>Streptococcus sp.</i> | | | | | <i>Escherichia coli strains</i> | | | | | <i>Klebsiella sp.</i> | | | | | <i>Pseudomonas sp.</i> | | | | |
|----------|---------------------------|-------|-------|-------|-------|--------------------------|-------|-------|-------|-------|---------------------------------|-------|-------|-------|-------|--------------------------|-------|-------|-------|-------|--------------------------|-------|-------|-------|-------|
| | Clinical isolate No. 01 | | | | | Clinical isolate No. 02 | | | | | Clinical isolate No. 03 | | | | | Clinical isolates No. 04 | | | | | Clinical isolates No. 05 | | | | |
| | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 |
| (+) | 31.67 | 31.67 | 31.67 | 31.00 | 31.67 | 22.67 | 23.00 | 22.33 | 22.33 | 22.00 | 30.33 | 31.00 | 30.67 | 30.67 | 31.33 | 22.00 | 23.00 | 22.67 | 22.33 | 22.00 | 23.00 | 22.67 | 22.33 | 22.33 | 22.33 |
|) | ± | ± | ± | ± | ± | ± | ± | ± | ± | ± | ± | ± | ± | ± | ± | ± | ± | ± | ± | ± | ± | ± | ± | ± | ± |
| | 0.58 | 0.58 | 0.58 | 0.00 | 0.58 | 0.58 | 0.00 | 0.58 | 0.58 | 0.00 | 0.58 | 0.00 | 0.58 | 0.58 | 1.54 | 0.00 | 0.00 | 0.58 | 0.58 | 0.00 | 0.00 | 0.58 | 0.58 | 0.58 | 0.58 |
| (-) | 0.00± | 0.00± | 0.00± | 0.00± | 0.00± | 0.00± | 0.00± | 0.00± | 0.00± | 0.00± | 0.00± | 0.00± | 0.00± | 0.00± | 0.00± | 0.00± | 0.00± | 0.00± | 0.00± | 0.00± | 0.00± | 0.00± | 0.00± | 0.00± | 0.00± |
| | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | .00 | | | | | | | | | | | | | | | | | | | | | | | | |
| A | 30.67 | 31.67 | 30.67 | 31.00 | 30.67 | 21.33 | 19.67 | 22.00 | 20.67 | 21.33 | 15.33 | 15.67 | 16.33 | 14.00 | 14.67 | 13.33 | 13.33 | 13.67 | 13.67 | 14.00 | 9.00± | 9.67± | 9.67± | 9.00± | 9.00± |
| | ± | ± | ± | ± | ± | ± | ± | ± | ± | ± | ± | ± | ± | ± | ± | ± | ± | ± | ± | ± | 0.00 | 0.58 | 0.58 | 0.00 | 0.00 |
| | 0.58 | 0.58 | 0.58 | 0.00 | 0.58 | 0.58 | 0.58 | 0.00 | 0.58 | 0.58 | 0.58 | 0.58 | 0.58 | 1.00 | 1.15 | 0.58 | 0.58 | 0.58 | 0.58 | 0.00 | | | | | |
| B | 28.00 | 27.00 | 27.67 | 28.00 | 28.00 | 20.00 | 21.00 | 20.33 | 20.00 | 19.67 | 13.00 | 14.00 | 14.00 | 13.67 | 13.00 | 11.00 | 11.33 | 11.67 | 11.33 | 12.00 | 7.67± | 9.33± | 8.33± | 8.33± | 8.00± |
| | ± | ± | ± | ± | ± | ± | ± | ± | ± | ± | ± | ± | ± | ± | ± | ± | ± | ± | ± | ± | 0.58 | 0.58 | 0.58 | 0.58 | 0.00 |
| | 0.5 | 0.5 | 0.58 | 0.5 | 0.5 | 1.00 | 1.00 | 0.58 | 0.00 | 0.58 | 1.00 | 0.00 | 0.00 | 0.58 | 0.00 | 0.00 | 0.58 | 0.58 | 0.58 | 0.00 | | | | | |
| C | 24.67 | 25.00 | 24.67 | 24.67 | 25.00 | 17.00 | 15.67 | 17.00 | 17.00 | 17.67 | 10.00 | 10.67 | 10.67 | 11.33 | 10.00 | 9.33± | 9.67± | 9.33± | 10.00 | 9.67± | 7.00± | 8.00± | 7.33± | 7.33± | 7.33± |
| | ± | ± | ± | ± | ± | ± | ± | ± | ± | ± | ± | ± | ± | ± | ± | ± | ± | ± | ± | ± | 0.00 | 0.00 | 0.58 | 0.58 | 0.58 |
| | 0.58 | 0.5 | 0.58 | 0.58 | 0.00 | 0.00 | 0.58 | 1.00 | 1.00 | 0.58 | 0.00 | 0.58 | 0.58 | 0.58 | 0.00 | | | | 0.00 | | | | | | |
| D | 32.00 | 32.00 | 32.67 | 32.00 | 31.67 | 23.33 | 23.67 | 23.33 | 22.67 | 23.00 | 17.33 | 18.00 | 18.00 | 17.67 | 17.33 | 14.67 | 15.33 | 15.00 | 14.67 | 15.67 | 11.00 | 11.00 | 11.67 | 11.33 | 11.33 |
| | ± | ± | ± | ± | ± | ± | ± | ± | ± | ± | ± | ± | ± | ± | ± | ± | ± | ± | ± | ± | ± | ± | ± | ± | ± |
| | 0.00 | 0.5 | 0.58 | 0.00 | 0.58 | 0.58 | 0.58 | 0.58 | 0.58 | 0.00 | 0.58 | 0.00 | 0.00 | 0.58 | 0.58 | 0.58 | 0.58 | 0.00 | 0.58 | 0.58 | 0.00 | 0.00 | 0.58 | 0.58 | 0.58 |

Table: Zones of inhibition of metallic silica nanohybrids incorporated nanofiber mats against clinical isolates of previously tested ATCC cultures of all the test strains of fungi

| | <i>Candida albicans</i> | | | | | <i>Trichophyton rubrum</i> | | | | | <i>Microsporum gypseum</i> | | | | | <i>Aspergillus niger</i> | | | | | | | | |
|----------|-------------------------|--------|--------|--------|--------|----------------------------|--------|--------|--------|--------|----------------------------|--------|--------|--------|--------|--------------------------|--------|--------|--------|--------|--------|--------|--------|--------|
| | Clinical isolate | | | | | Clinical isolate | | | | | Clinical isolate | | | | | Clinical isolates | | | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 | | | | |
| (+) | 32.67± | 32.67± | 32.00± | 32.00± | 32.00± | 23.67± | 20.00± | 23.00± | 23.33± | 23.67± | 21.00± | 20.67± | 20.00± | 21.00± | 20.67± | 20.00± | 20.33± | 20.00± | 20.67± | 21.00± | 20.33± | 20.00± | 20.67± | 21.00± |
| | 0.58 | 0.58 | 0.00 | 0.00 | 0.00 | 0.58 | 0.00 | 0.58 | 0.58 | 0.00 | 0.00 | 0.58 | 0.00 | 0.58 | 0.58 | 0.00 | 0.58 | 0.00 | 0.58 | 0.00 | 0.58 | 0.00 | 0.58 | 0.00 |
| (-) | 0.00±0 | 0.00± | 0.00± | 0.00± | 0.00± | 0.00± | 0.00± | 0.00± | 0.00± | 0.00± | 0.00± | 0.00± | 0.00± | 0.00± | 0.00± | 0.00± | 0.00± | 0.00± | 0.00± | 0.00± | 0.00± | 0.00± | 0.00± | 0.00± |
| | .00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| A | 30.67± | 30.00± | 29.00± | 28.50± | 28.50± | 16.00± | 16.33± | 16.67± | 16.00± | 16.33± | 13.67± | 13.33± | 13.67± | 13.00± | 13.00± | 12.67± | 12.33± | 12.67± | 12.67± | 12.00± | 12.67± | 12.67± | 12.67± | 12.00± |
| | 0.58 | 1.00 | 1.00 | 0.00 | 0.58 | 0.00 | 0.58 | 0.58 | 0.00 | 0.58 | 0.58 | 0.58 | 0.58 | 0.00 | 0.00 | 0.58 | 0.58 | 0.00 | 0.58 | 0.58 | 0.58 | 0.58 | 0.58 | 0.00 |
| B | 27.00± | 26.50± | 26.50± | 27.00± | 28.00± | 14.67± | 14.33± | 14.67± | 14.00± | 14.00± | 11.00± | 11.67± | 11.00± | 11.67± | 11.67± | 11.33± | 11.00± | 11.00± | 11.67± | 10.67± | 11.00± | 11.00± | 10.67± | 10.67± |
| | 0.5 | 0.50 | 0.00 | 1.00 | 0.5 | 0.58 | 0.58 | 0.58 | 0.00 | 0.00 | 0.58 | 0.58 | 0.58 | 0.58 | 0.58 | 0.58 | 0.00 | 0.58 | 0.58 | 0.58 | 0.00 | 0.00 | 0.58 | 0.58 |
| C | 24.67± | 25.00± | 25.00± | 25.00± | 25.00± | 12.33± | 12.67± | 12.67± | 12.67± | 12.67± | 10.00± | 10.33± | 10.67± | 10.00± | 10.00± | 9.00± | 9.33± | 9.66± | 10.00± | 10.00± | 9.00± | 9.33± | 9.66± | 10.00± |
| | 0.58 | 1.00 | 0.00 | 0.00 | 0.00 | 0.58 | 0.58 | 0.58 | 0.58 | 0.58 | 0.00 | 0.58 | 0.58 | 0.58 | 0.00 | 0.00 | 0.58 | 0.58 | 0.00 | 0.00 | 0.58 | 0.58 | 0.00 | 0.00 |
| D | 32.00± | 31.00± | 31.00± | 31.67± | 31.67± | 21.33± | 21.33± | 21.66± | 21.00± | 22.00± | 16.33± | 16.67± | 16.00± | 16.67± | 16.00± | 15.33± | 15.67± | 16.00± | 15.67± | 16.00± | 15.67± | 15.67± | 15.67± | 16.00± |
| | 1.00 | 1.00 | 0.00 | 0.58 | 0.58 | 0.58 | 0.58 | 0.58 | 0.00 | 0.00 | 0.58 | 0.58 | 0.00 | 0.58 | 0.58 | 0.58 | 0.58 | 0.00 | 0.58 | 0.58 | 0.00 | 0.58 | 0.58 | 0.00 |

(+) Positive control, (-) Negative control, (A) Ag – Si – CA - mat, (B) Cu – Si – CA - mat, (C) Co – Si – CA - mat and (D) Ag – Si + Cu - Si + Co - Si – CA -mat

Supplementary Data File 06

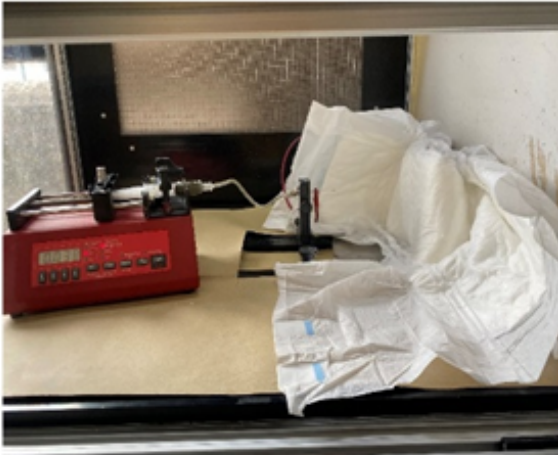
Table: *p* values for each comparison of mean values of inhibition zones values of different metallic silica nanohybrids incorporated nanofiber mats using two sample T test

| The significance difference between; | <i>p</i> value | | | | | | | | | | The mean values are significantly different |
|--------------------------------------|-----------------|----------------------|---------|---------------|----------------------|----------------------|--------------------|------------------|-------------------|-----------------|---|
| | <i>S.aureus</i> | <i>S. pneumoniae</i> | MRSA | <i>E.coli</i> | <i>K. pneumoniae</i> | <i>P. aeruginosa</i> | <i>C. albicans</i> | <i>T. rubrum</i> | <i>M. gypseum</i> | <i>A. niger</i> | |
| 1 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | Yes |
| 2 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | Yes |
| 3 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | Yes |

(1) Ag – Si – CA - mat and Ag – Si + Cu - Si + Co - Si – CA -mat (***) , (2) Cu – Si – CA - mat and Ag – Si + Cu - Si + Co - Si – CA -mat (**) and (3)) Co – Si – CA - mat and Ag – Si + Cu - Si + Co - Si – CA -mat (*).

Supplementary Data File 07

(a)



(b)



Supplementary data file 07: (a) The process of the electrospinning on the surface of a diaper and (b) Resulted nanofiber mat on the surface of the diaper.

Supplementary Data File 08

Table: p values of the one-way ANOVA test performed

| Microorganism | p value | Significantly different or not |
|----------------------|-----------|--------------------------------|
| <i>S. aureus</i> | 0.61 | No |
| <i>S. pneumonia</i> | 0.88 | No |
| <i>MRSA</i> | 0.92 | No |
| <i>E. coli</i> | 0.07 | No |
| <i>K. pneumoniae</i> | 0.09 | No |
| <i>P. aureginosa</i> | 0.57 | No |