SUPPORTING INFORMATION FOR:

**Preparation and optimization of Starch/Poly vinyl alcohol/ ZnO nanocomposite films applicable for food packaging**

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**Table S1.** Experimental variables and their coded levels for RSM-CCD.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Name | Units | Low | High | -alpha | +alpha |
| A (PVA) | g | 0.3 | 0.9 | 0 | 1.2 |
| B (Glycerol) | g | 0.75 | 1.25 | 0.5 | 1.5 |
| C (ZnO) | % | 1.25 | 3.75 | 0 | 5 |

**Table S2.** The generated polynomial equation from the reduced quadratic model in terms of actual factors for responses.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Response | Final equation in terms of code factors | P | PLOF | R2 | Adj.R2 | AP |
| Formation (a. u.)  | 1.85341+0.519886A-3.73977B-0.195227C-0.083333AB-0.41667AC+0.2200BC+1.15530A2+1.66364B2+0.050545C2 | 0.0001 | 0.3167 | 0.9366 | 0.9796 | 13.90 |
| Tensile Strength (MPa) | -2.48262-9.09260A+37.02690B-3.10059C-6.74646AB-0.264668AC+3.10085BC+12.0780A2-20.53928B2-0.082219C2 | 0.0001 | 0.0001 | 0.9657 | 0.9348 | 24.10 |
| Elongation (%) | -52.34097+69.39194A+14.92536B+2.75656C+14.78497AB-10.93579AC-8.85095BC-22.60936A2+47.95662B2+1.91959C2 | 0.0001 | 0.0001 | 0.9799 | 0.9619 | 28.19 |
| Solubility in water (%) | 86.70-38.61032A-100.76102B-12.84748C+40.6583AB-4.6750A+9.6300BC+31.7594A2+34.03364B2+1.25095C2 | 0.0005 | 0.8426 | 0.9066 | 0.8225 | 10.99 |
| WVP (g H2O/pa.s.m×10-10) | -1.11438E-07+1.52025E-07A+8.31723E-08B+2.14198E-08C-1.4347E-09AB-1.7483E-08AC+2.3761E-08BC-5.4311E-08A2-4.5758E-08 B2-6.6515E-09 C2 | 0.0001 | 0.5832 | 0.9872 | 0.9757 | 28.83 |
| Swelling (%) | 886.5169-787.16939A-778.85B-120.02C+214.8914AB+51.78363AC+54.05013BC+300.16484A2+230.12199B2+5.20488C2 | 0.0001 | 0.0002 | 0.9402 | 0.8864 | 14.59 |



**Figure S1.** Normal plots of residuals of responses; (A) Formation; (B) Tensile strength; (C) Elongation at break; (D) WVP; (E) Solubility; (F) Swelling.



**Figure S2.** Desirability of responses as optimization of effective factors for preparation of optimum starch/PVA/ZnO nanocomposite films.