

**Electronic Supplementary Information (ESI)**

**Development of high performance high voltage insulator for power  
transmission line from blends of polydimethylsiloxane/ethylene vinyl acetate  
containing nanosilica**

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### *TEM Analysis*

TEM analysis reveals dispersion of filler particles (Fig. S1a-d). The most important criteria are the dispersion of nanosilica in polymer matrix should be homogeneous, because nanosilica is non-reinforcing filler, inhomogeneities may cause the structural defects in the nanocomposite materials. Filler dispersion in polymer matrix can be seen from bulk morphology through Analytical TEM. With increasing nanofiller dispersion and distribution of filler in the matrix are changes. Uniform dispersion and distribution are observed up to 6 phr (fig. S1b) and thereafter nanofiller agglomeration and aggregation are observed.

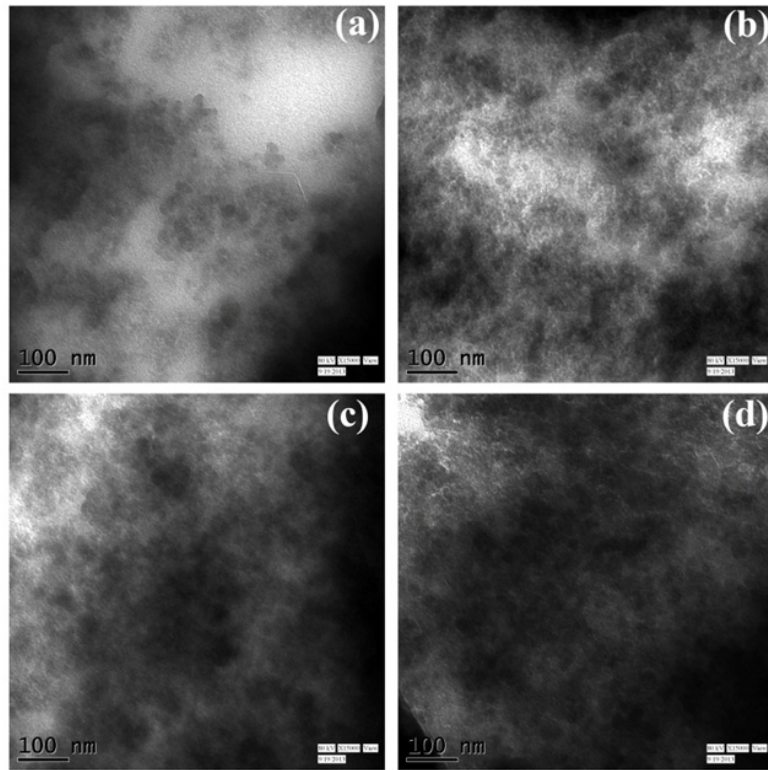


Fig. S1. TEM micrograph of (a) 3, (b) 6, (c) 9 and (d) 12 phr nanosilica filled nanocomposites.

*AFM Analysis*

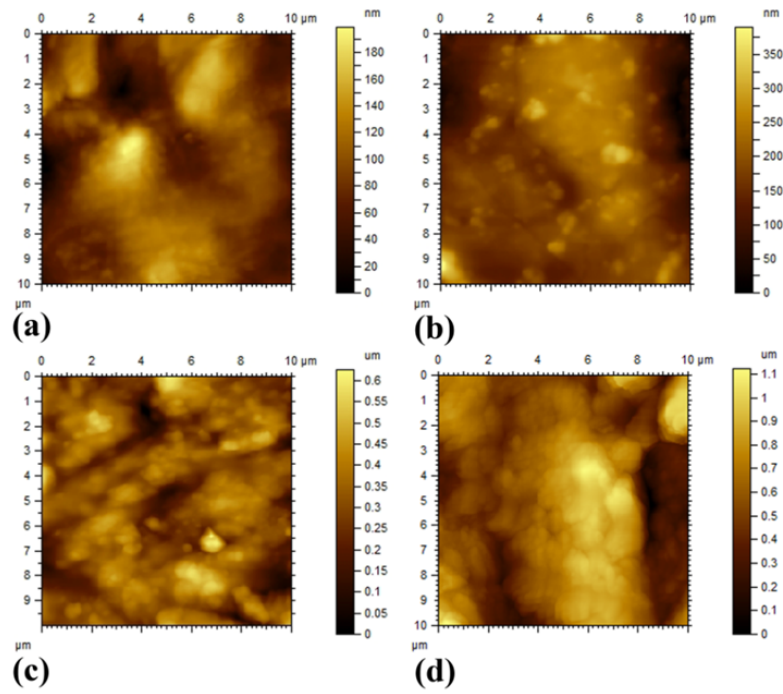


Fig. S2. AFM 2D images of 6 phr nanosilica filled (a) unaged, (b) boiling water, (c) heat and (d) UV aged nanocomposites.

Table S1. Height parameter of 6 phr nanosilica filled (PES6) unaged, boiling water, heat and UV aged nanocomposites.

Type of aging	Root mean square height ( $S_q$ ), nm	Maximum peak height ( $S_p$ ), nm	Maximum pit height ( $S_v$ ), nm	Maximum height ( $S_z$ ), nm	Arithmetic mean height ( $S_a$ ), nm
Unaged	32	108	91	199	26
Boiling Water	58	212	178	390	44
Heat	87	309	317	625	67
UV	207	526	596	1120	172

*Electrical tracking analysis*

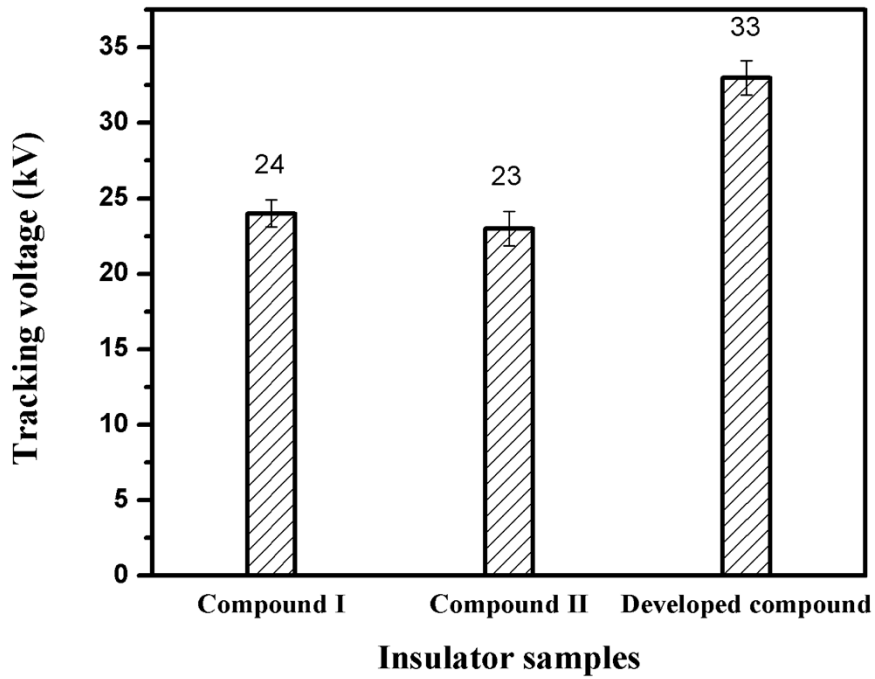


Fig. S3. Comparison of the dry tracking voltage of the developed compound in the present investigation with two commercially available compounds which are generally used for the preparation of the high voltage insulators for power transmission line.