Electronic Supplementary Material (ESI) for RSC Advances.

Supporting information

Radiation crosslinked blends based on Ethylene Octene Copolymer (EOC) and Polydimethyl siloxane (PDMS) rubber with special reference to the Optimization of Processing Parameters

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Impact of interaction parameters

An interaction plot corresponds to a single plot for two parameters and a matrix of plots for three or more parameters. **Figure S1** displays the levels of one parameter on the x-axis and has a separate line for the mean level of other parameters. It also represents the interaction plot considering the tensile strength and elongation at break. In the interaction plot, perfect parallel lines indicate that there is no interaction between the parameters. In this interaction plot, there is much deviation from the parallel curves which indicates that there is the higher degree of interaction between the parameters.

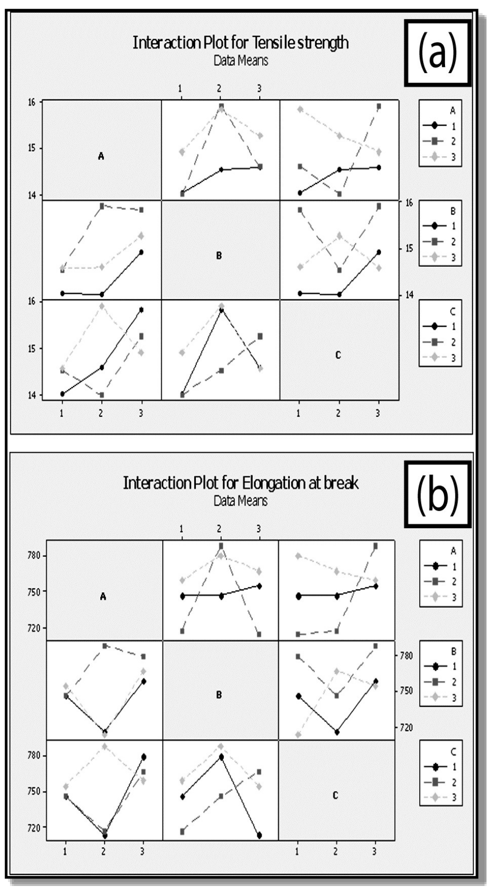

Figure S1. Interaction plot for design parameters (a) tensile strength, (b) elongation at break.

Analysis of variance studies

For better understanding of the impact of various control parameters on experimental data, it is desirable to develop the Analysis of Variance technique (ANOVA) to find out the best performance factors. ANOVA helps in evaluating the influence of each variable on the total variance of the results. In this paper, a three level three-factor unbalanced Taguchi design is used. So a general linear model is used for ANOVA.

For each designed parameter, ANOVA provides the following factors; degree of freedom (d.f.), the sequential sum of squares (Seq SS), the adjusted (partial) sum of squares (Adj SS), the adjusted mean squares (Adj MS), the F static from the adjusted squares and the percentage contribution. Percentage contribution is calculated from the following equation.

$$\text{Percentage contribution} = (SS_K/SS_T) \times 100 \text{------------------} \quad (9)$$

where SS_K is the sum of squares of parameter K and SS_T is the total sum of squares.

Table S1: Analysis of variance of processing parameters considering tensile strength as performance property

Property	Factors	d.f.	Seq SS	Adj SS	Adj MS	F	Percentage of contribution
	A	2	1.3647	1.3647	0.6823	5.78	35.19
Tensile	B	2	1.8460	1.8460	0.9230	7.82	47.60
Strength	C	2	0.4310	0.4310	0.2155	1.83	11.11
	Error	2	0.2360	0.2360	0.1180		6.08
	Total	8	3.8777				

Adj MS: adjusted mean squares, Adj SS: adjusted (partial) sum of squares, d.f.: degrees of freedom, Seq SS: sequential sum of squares. S = 0.343527, R-Sq = 93.91%, R-Sq (adj) = 75.65%

Table S2: Analysis of variance of processing parameters considering elongation at break as performance property

Property	Factors	d.f.	Seq SS	Adj SS	Adj MS	F	Percentage of contribution
	A	2	1314.9	1314.9	657.4	1.16	25.77

Elongation	B	2	1638.2	1638.2	819.1	1.44	32.10
at break	C	2	1014.2	1014.2	507.1	0.89	19.87
	Error	2	1134.9	1134.9	567.4		22.22
	Total	8	5102.2				

Adj MS: adjusted mean squares, Adj SS: adjusted (partial) sum of squares, d.f.: degrees of freedom, Seq SS: sequential sum of squares. S = 23.8211, R-Sq = 77.76%, R-Sq (adj) = 11.03%

Table S1 and **Table S2** show the results of the ANOVA for tensile strength and elongation at break respectively. The factors such as temperature, shear rate and time of mixing are taken as the fixed factors. The analysis was performed at a level of significance of 5%.

The value of R^2 in the ANOVA for tensile strength is found to be 93.91%, which imply that there is significant fitting between general linear model and the experimental data. And in the case of ANOVA for the elongation at break, the R^2 value is 77.76% that is also theoretically acceptable. From these tables, one can infer that the percentage contribution of the individual parameters on the response is in agreement with the rank of parameters calculated from S/N ratios as shown in **Table 6** in the main manuscript.