PHOTODEGRADATION EFFECT OF THE ELECTRON BEAM IRRADIATED DEVULCANIZED NATURAL RUBBER/POLYPROPYLENE COMPOUND UNDER NATURAL WEATHERING CONDITION

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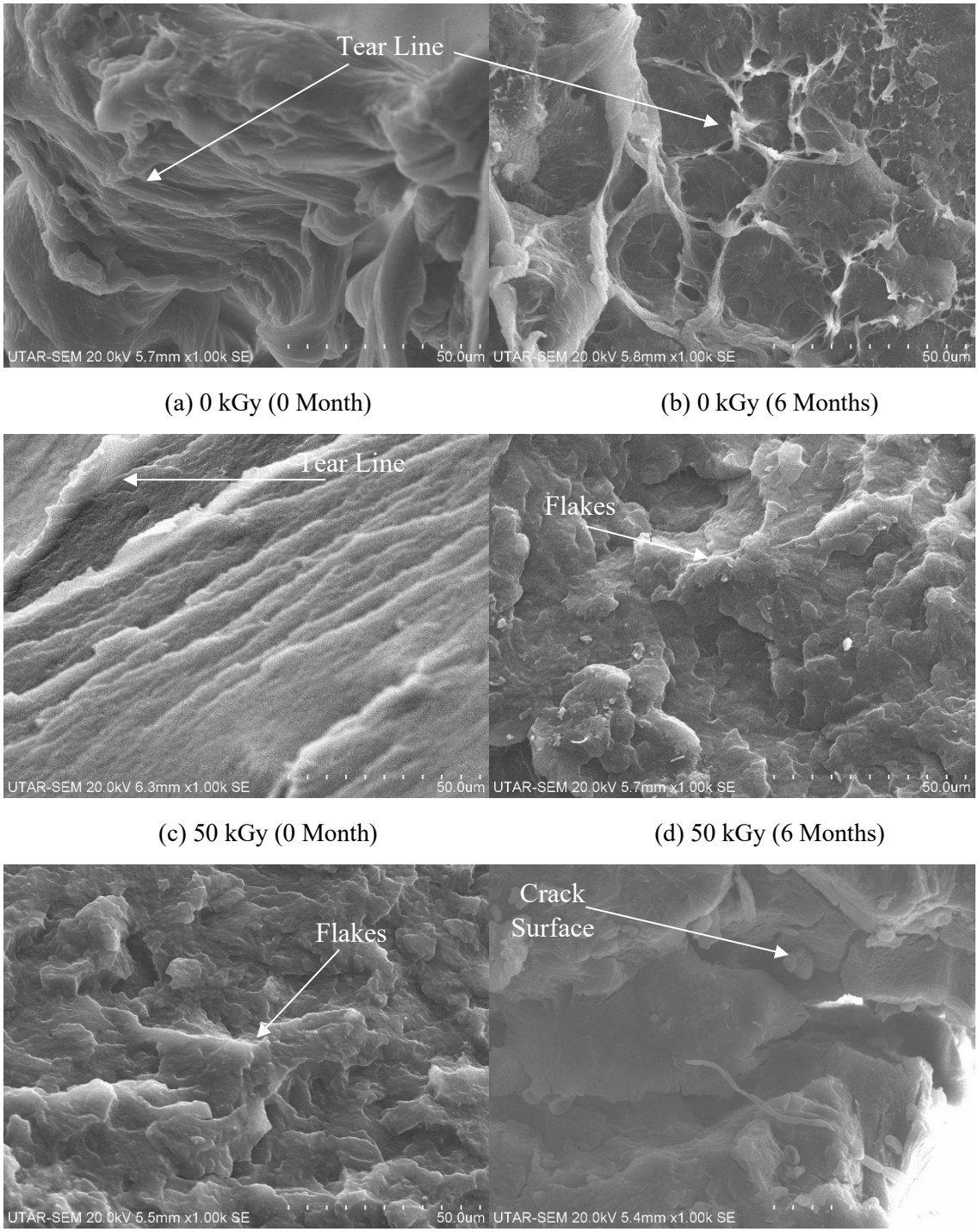
This study aims to investigate the photo-degradation effect under UV source for the different irradiation dosages of the polypropylene/devulcanized natural rubber (PP-DVC) compound. The DVC was used to improve the impact resistance of the PP-DVC compound at the range of 0 – 20 phr. These samples were subjected to electron beam irradiation at a dosage range of 0 – 200 kGy to induce the formation of crosslinking networks in polymer matrix. Then, these samples further proceed for natural weathering testing for the range of 0 - 6 months. It was found that the addition of 5 phr DVC added in PP irradiated at 50 kGy has the optimum value for the mechanical properties after exposed to outdoor for 6 months. The gel content increased with longer exposure period due to the predominance of cross-linking formation by photo-oxidation under UV exposure. However, the fractured surface has changed from tear lines appearance to flake-like appearance. The crystallinity has reduced as the degradation of the PP matrix by chain scission and lead to poor dispersion of DVC particles in PP matrix when exposed to outdoor for a longer period. The carbonyl index increased as the carbonyl formation for PP after weathering is proportional to the number of chain scission that occurred in the PP.



(a) 0 kGy (0 Month) (b) 0 kGy (6 Months)

(c) 50 kGy (0 Month) (d) 50 kGy (6 Months)

(e) 200 kGy (0 Month) (f) 200 kGy (6 Months)

SEM Micrographs of Fractured Surface for Different Irradiation Dosages of 5 phr DVC added in PP before and 6 Months Outdoor Exposure under Magnification of 1000x.