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UV-SURFACE TREATMENT OF FUNGAL RESISTANT POLYETHER POLYURETHANE AND POLYSULFONE FILMS-INDUCED GROWTH OF ENTOMOPATHOGENIC FUNGI

Daniel Eduardo Weibel
Federal University of Rio Grande do Sul, Brazil

Synthetic polymers are the cause of some major environmental impacts due to their low degradation rates. Polyurethanes (PU) and polysulfone (PSU) are widely used synthetic polymers, and their growing use in industries has caused an increase in plastic waste. A commercial polyether-based thermoplastic PU with hydrolytic stability and fungus resistance was only attacked by an entomopathogenic fungus, *Metarhizium anisopliae,* when the films were pre-treated with ultraviolet (UV) irradiation in the presence of reactive atmospheres. The same results were obtained for PSU films. The films were mainly characterized by WCA, FTIR-ATR, SEM, and optical profilometer measurements. Permanent hydrophilic PU and PSU films were produced by the UV-assisted treatments. Pristine polyether PU and PSU films incubated for 10, 30, and 60 days did not show any indication of fungal growth. On the contrary, when using oxygen in the UV pre-treatment, a layer of fungi spores covered the sample, indicating a great adherence of the microorganisms to the polymer. However, when acrylic acid vapors were used during the UV pre-treatment, a visible attack by the entomopathogenic fungi was observed. SEM and FTIR-ATR data showed clear evidence of fungal development; growth and ramifications of hyphae on the polymer surfaces with the increase in UV pre-treatment time and fungus incubation time. The results indicated that the simple UV surface activation process has proven to be a promising alternative for polyether PU and PSU waste management.

Biography

Daniel Eduardo Weibel studied Chemistry (Diploma) at the National University of Córdoba (UNC), Argentina and obtained his PhD in Physical Chemistry from University of North Carolina. He spent his Post-doctoral period at the University of Gakushuin (Japan), Munster University, (Germany) and Manchester University, (UK). He is currently an Associate Professor at the UFGRS, Brazil. He has experience in the field of Physical-Chemistry and in particular in surface science acting on the following topics: synchrotron radiation, polymers and photochemistry. His research has wide applications in self-cleaning and protective coatings, biomaterials, biocompatibility and biodegradation, photocatalysis and hydrogen generation by the water splitting reaction. His research interests also include surface science and surface modification of polymers.

danielw@iq.ufrgs.br