A COMPARATIVE STUDY OF DIFFERENT POLYMER MATRIX WITH PHOTOACTIVE PIGMENT ON THERMAL AND ANTIBACTERIAL PROPERTIES

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Objectives

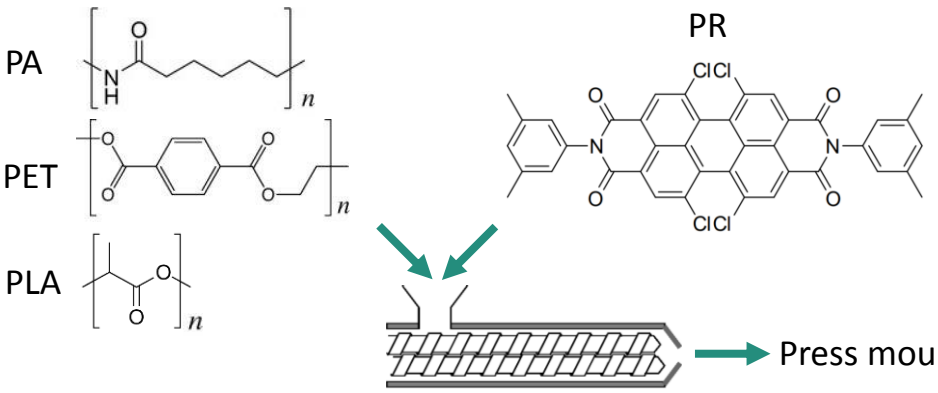
In this work, PA, PET, and PLA matrices with incorporated 0.5 %wt. of pigment were thermoplasticaly prepared with the aim of studying thermal and antibacterial properties of coloured polymer films.

Materials and methods

PA6 Technyl C402M Natural (Solvay), PET Lighter C93 (Equipolymers), PLA 2003D (Naturework): Resinex Ltd., Czech Republic.
Perylene based pigment (PR): Centre of Organic Chemistry Ltd., Czech Republic.

DSC (DSC1 STAR system, Mettler Toledo), TGA (Q500 device, TA Instruments), ISO 22196:2011 against *Enterococcus faecalis* CCM3956 (incubation under artificial daylight), SEM (Phenom Pro, Phenom-World).

Sample preparation and results



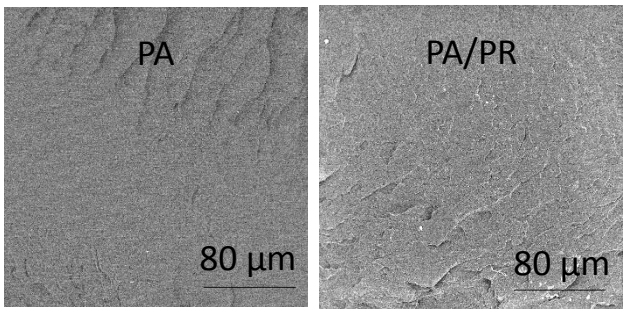


Fig. Cryo-fractured structure

Tab. Results of DSC, TGA and ISO 22196:2011 analysis

Sample	T_g (°C)	T_m (°C)	T_c (°C)	X_c (%)	T_d (°C)	Antibacterial activity R
PA	-	218.0	185.2	1.4	431.5	-
PA/PR	-	218.6	183.8	-	428.7	1.3
PET	78.3	246.8	213.1	1.4	411.7	-
PET/PR	80.5	245.0	211.1	-	412.3	0.3
PLA	60.2	149.9	116.8	1.0	337.7	-
PLA/PR	60.0	148.4	104.8	10.6	338.5	0

Conclusions

Perylene based pigment:

- slightly changes T_c of PA and PET (a decrease of 2 °C); reduces T_c and increases crystallinity (up to 10 %) of PLA.
- caused insignificant shifts of T_d.
- incorporated in PA shows antibacterial activity of the surface against *Enterococcus faecalis*.

The obtained results indicate the perylene based additives as a alternative pigment platform in the treatment of polymer matrices.

Polymers are close to our hearts

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