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Development of LDPE-EVA Clay Nanocomposite Films for Agricultural Purposes*

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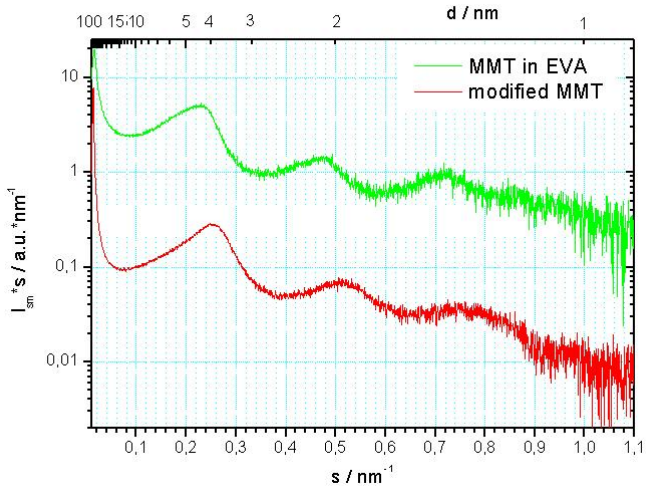
Since the mid 80´s polymer clay nanocomposites is a fast growing research area, because of the unique properties only a few percent clay can add to the neat polymer. Several nanocomposite-materials had been announced under which are e.g. polyamides for valve covers (Toyota), polyolefines for step assists (GM) and many others. But there are still many problems to be solved with the materials besides getting into market, reasoning no available commercial product this very days.

In development of EVA based nanocomposites the aim is to produce a film more stable to agricultural chemicals and with prolonged duration of use, thus adding value to the enviroment (less waste), to the farmers (lower costs per year) and the producer (higher market prices). It had been thought that EVA-clay films could easily be made as EVA-nanocomposites were already described as type of exfoliated and intercalated system side by side. Some already existing experience with PP flat films encouraged us to use the technology developed at the IPF for more than 4 years in the PP-nanocomposite-reinforcement area. This is a batch compounding of the clay material with EVA in case of agricultural films. As expected during this step an increase in interlayer distance could be obtained. In the second step this batch was diluted with LDPE. Again Small Angle X-Ray Scattering experiments showed an increase in interlayer distance thus giving evidence for intercalation. Even TEM-pictures showed stacks with only a low number of clay platelets.



The more the surprise was, when transferring these experiments from the DACA microcompounder to the extruder and film blowing. The blown film based on EVA and LDPE had plenty of fish eyes whereas a flatfilm based on PP/PP-g-MA had nearly none. After several development steps, finally a blown film based on EVA and LDPE could be made. It could be shown, that these films retain the stabilizing system longer than a film without clay addition.

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