

Influence of the pH-value on the Properties of ORMOCER® Coatings

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ORMOCER®s are hybrid polymers consisting of an inorganic (siloxane-based) and an organic network and can be used as coating materials for many different applications (e.g. barrier or scratch resistance).^[1] In recent years, these materials have been combined with biobased and/or biodegradable components. The resulting biodegradable coatings (bioORMOCER®s) can be used for biocompatible packaging solutions to enhance their barrier properties.^[2,3]

In this case, ORMOCER®s contain epoxy moieties (to form the organic network), functionalized hemicellulose (as biocomponent) and different kinds of metal complexes (as modifier for the inorganic network).

For typical applications, a dense network with covalent bonds between the biocomponent and the ORMOCER® base is desirable.

Due to their composition and the reaction conditions, the ORMOCER® sols usually have low pH-values between 3 and 4.5. Under these conditions, a covalent linkage of the biocomponents is not possible because of their solubility and the protonation of functional groups.

Therefore, two approaches for adjusting of the pH-value were tested. The first one is the pH-adjustment after the synthesis and the second one is the synthesis of an acid sol, which is normally basic.

During pH-studies of different sol-compositions we found that the pH-value of the sol is highly influenced by the nature of the metal complexes used in the synthesis.

As a result, the properties of the coatings as well as the reaction kinetics or the pot life of the sol can be adjusted by the use of different metal-ligands.

Literature:

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[3] S. Amberg-Schwab et al., Protection for bioplastics, European Coatings Journal **12-2015**, 32-36.