Organic-inorganic biodegradable hybrids based on cellulose acetate butyrate

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Cellulose has received a great deal of attention in recent decades as a substitute for petrochemical based polymers. Natural polymers show some limitations, for instance with regard to poor processability or high water absorption. Cellulose esters such as cellulose acetate butyrate (CAB) are less hydrophilic, than cellulose, and thermoplastic materials. Plasticizers as polymer additives serve to decrease the intermolecular forces between the polymer chains, resulting in a softened and flexible polymeric matrix. They increase the polymer's elongation and enhance processability by lowering the melting and softening points and viscosity of the melts.

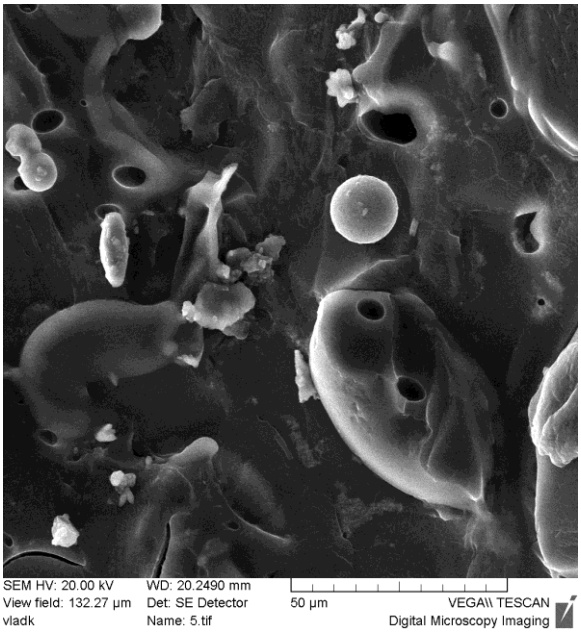

Fig. SEM image of organic-inorganic biodegradable hybrid

The present work reports the biodegradable blends preparation of hydrophobic cellulose acetate butyrate (CAB) with two water soluble biodegradable polymers: polyvinyl alcohol (PVOH) and potato starch. For that purpose, plasticization of CAB and PVOH was conducted by melt extrusion using triacetin and glycerol. TEOS was introduced on stage of blend preparation and catalytic amount of HCl (0.1 M) was added to initiate the sol-gel process of SiO_2 particles preparation. The prepared materials were characterized by DTA, X-ray diffraction, IR-spectroscopy, and scanning electron microscopy (SEM) (Fig.). Mechanical properties were investigated using a universal tensile machine (Instron 5969).