The main goal of the project is to obtain selectively biodegradable transdermal drug delivery systems sensitive to the pH and temperature changes (Figure 1). It is assumed that the unique structure of the obtained polymers should allow an effective penetration of the skin barrier and controlled release of an active compounds placed in polymeric carrier using either chemical bonding or physical interactions.

Conjugation of the compounds used in the treatment for psoriasis, i.e. acitretin (AC) or methotrexate (MTX), by means of covalent bonding is designed to improve the therapeutic effect by the gradual release of a reduced dose of the drug directly at the site of the pathologically changed tissue. Consequently, nanoprecipitation of the polymer-drug conjugates with vitamin D3 will result in physical entrapment of vitamin inside the nanocapsules. The scientific description of results will be based on corresponding analytical techniques: spectroscopy, mass spectrometry, chromatography and microscopy. The release kinetics of active compounds carried out by means of the vertical diffusion cells in conditions simulating the skin (synthetic membrane or artificial skin, as the approximate model for transdermal diffusion), or kinetics of degradation of the synthesized polymer matrices, will verify the influence of the carriers structure on their efficacy. Preliminary biological *in vitro* studies on normal human epithelial fibroblasts (NHDF) and keratinocytes will be performed in order to determine the cytotoxicity of the obtained compounds.

The project aims to develop research on an alternative and non-invasive transdermal therapeutic systems (TTS) for the topical delivery of an active substances used in the treatment of skin diseases such as psoriasis, which today is incurable.

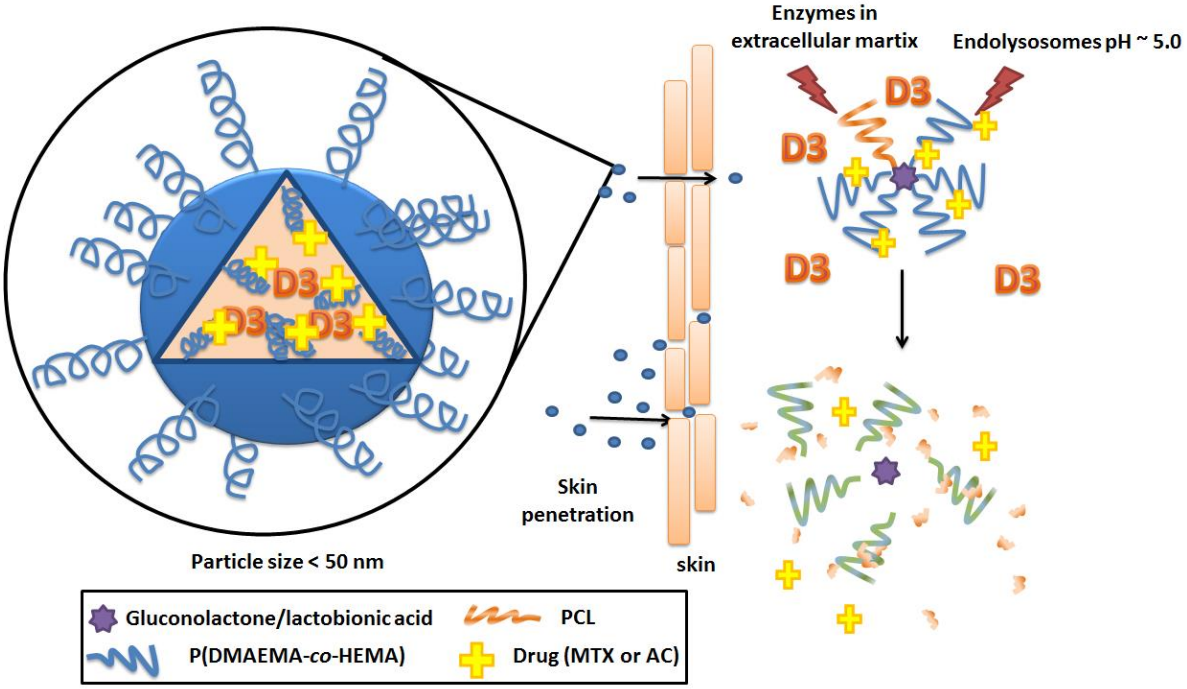

Figure 1. The illustrative penetration of polymeric nanocapsules through the skin barrier and selective hydrolysis of a single macromolecule.