Poly(ethylene glycol)-modified zirconium phosphate nanoplatelets for improved cisplatin delivery

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Nanoparticles are being explored as anticancer drug delivery agents since they can specifically target tumor cells by the Enhanced Permeability and Retention Effect. Recently, we have demonstrated that the anticancer drug cisplatin can be intercalated in nanoparticles of the layered inorganic material zirconium phosphate (ZrP). Results of in-vitro drug release as well as cytotoxicity studies with breast-cancer cell lines indicate that these materials are promising for cancer treatment. In this project, surface modification of cisplatin-intercalated ZrP nanoparticles (CisPt@ZrP) is proposed as a manner of improving the drug delivery system's biocompatibility. The surface of CisPt@ZrP will be modified first with an amorphous layer of Zr(IV) followed by reaction with monomethyl-poly(ethylene glycol)-monophosphate (m-PEG-PO_3). We have previously demonstrated that PEGylation of drug-carrying ZrP nanoparticles results in improved targeting *in vitro*. To further enhance the selectivity of the drug delivery system to the MDA-231 cell line—in which an over expression of folic acid receptors ensues—the bonding of folic acid to the distal end of the PEG polymer chain is to be assessed. The use of these materials for cancer treatment could prove to represent a new strategy for nanotherapeutics.