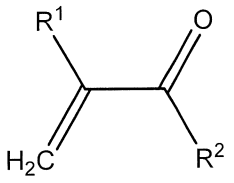
CLAIMS

1. Use of a synthetic macromolecular conjugate for selective interaction with proteins, which contains a copolymer to which at least one affinity tag, at least one imaging probe and at least one targeting ligand are bound via covalent bonds for identification, visualization, quantification or isolation of proteins and/or cells *in vitro*, or in an immunochemical method,

wherein said copolymer is a copolymer obtainable by copolymerization of at least one monomer of Formula 1:



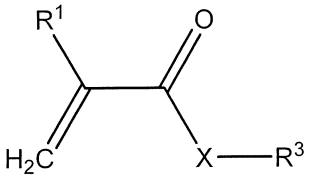
(1)

wherein:

R^1 is selected from H, CH_3;

R^2 is selected from NH_2, NH-CH_2-CH(OH)-CH_3, NH-CH_3, NH-CH_2CH_3, NH-CH_2CH_2-OH, NH-$CH_2CH_2CH_2$-OH, $NHC(CH_2OH)_3$, NH-CH_2CH_2-$N^+(CH_3)_3Cl^-$, O-CH_2CH_2-OH, O-$(CH_2CH_2O)_2$-H O-$(CH_2CH_2O)_3$-H, O-CH_2CH_2-$N^+(CH_3)_3Cl^-$, NH-$(CH_2)_3N^+(CH_3)_2$-$(CH_2)_2$-COO^-;

and at least one monomer of Formula 2:



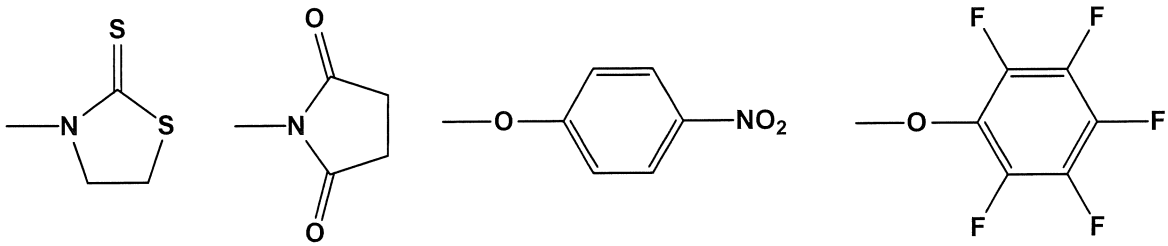
(2)

wherein:

R^1 is selected from H, CH_3, and

X is selected from NH-$(CH_2)_2$-CO, NH-$(CH_2)_3$-CO, NH-$(CH_2)_4$-CO, NH-$(CH_2)_5$-CO, Gly, GlyGly, GlyPheLeuGly, and

R^3 is selected from



whereas at least one reactive group R^3 is replaced by the targeting ligand, at least one reactive group R^3 is replaced by the affinity tag, and at least one reactive group R^3 is replaced by the imaging probe,

and wherein said imaging probe is selected from the group consisting of fluorescent moieties, radionuclides and metal complexes.

2. The use according to claim 1, wherein the molecular weight of the conjugate is preferably in the range of 1000 to 500000 g/mol, preferably in the range of 20000 to 150000 g/mol.

3. The use according to any one of the preceding claims, wherein the targeting ligand is a moiety capable of selectively binding to the targeted protein or peptide sequence, in particular the targeting ligand is selected from the group comprising an inhibitor or substrate of the targeted enzyme, an agonist or antagonist of the targeted receptor, a ligand of the targeted protein resin.

4. The use according to any one of the preceding claims, wherein the targeting ligand is attached to the synthetic copolymer via a flexible linker based on polyethylene glycol, peptide, preferably a peptide having a molecular weight from 100 to 5000 g/mol, or nucleic acid, preferably a nucleic acids comprising 1 to 40 nucleotides, or oligosaccharide, preferably an oligosaccharide containing 1 to 40 monosaccharides.

5. The use according to any one of the preceding claims, wherein the affinity tag is selected from biotin, His-tag, FLAG tag, HA tag, Strep-tag, Avi-Tag, GST-tag, c-myc-tag, V5-tag, E-tag, S-tag, SBP-tag, poly(Glu)-tag, calmodulin tag.

6. The use according to claim 5, wherein the imaging probe is selected from the group consisting of fluorophores with an excitation maximum in the range of 350 to 850 nm, preferably ATTO488 or DY676; lanthanide complexes, preferably of Gd, Mn, Dy, Eu; radionuclide complexes ^{64}Cu, ^{68}Ga, ^{18}F, ^{99m}Tc, ^{123}I, ^{125}I, ^{131}I, ^{57}Co, ^{51}Cr, ^{67}Ga, ^{64}Cu, ^{111}In, ^{90}Y.

7. The use according to any one of claims 1 to 6 in an immunochemical method which is selected from ELISA, flow cytometry, immunocytochemistry, immunohistochemistry, Wester blotting and modifications thereof.

8. Use of the macromolecular conjugate as defined in any one of claims 1 to 6 for the manufacture of a composition for identification, visualization, quantification or isolation of proteins and/or cells *in vivo* in methods of magnetic resonance, radiodiagnostics and/or radiotherapy.

9. The use according to any of claims 1 to 8, wherein the target protein is GCPII, GCPIII, CA-II, CA-VII, CA-IX, HIV-1 protease, aspartate protease.