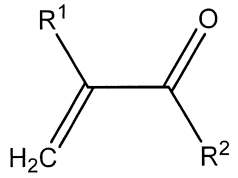
CLAIMS

1. Synthetic macromolecular conjugate for selective interaction with proteins, comprising a synthetic copolymer, and at least one binding group and at least one further group selected from an affinity tag and an imaging probe selected from the group consisting of fluorescent moieties, radionuclides and metal complexes, said at least one binding group and at least one further group being bound via covalent bond to said synthetic copolymer

wherein

the synthetic copolymer is a copolymer obtainable by copolymerization of at least one monomer of Formula 1:



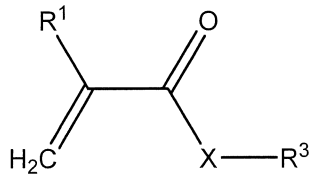
(1)

wherein:

R^1 is selected from H, CH_3; and

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:



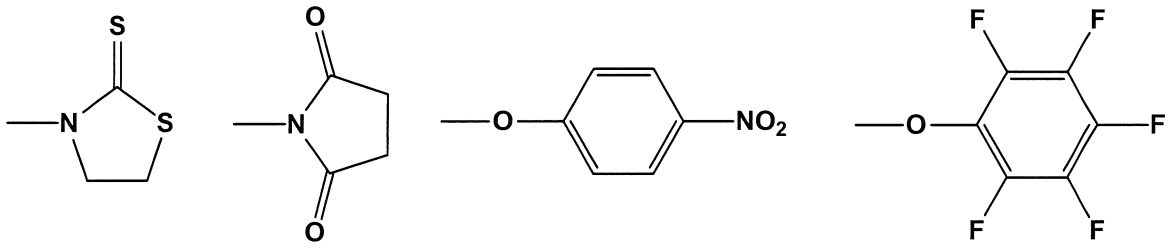
(2)

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 in the copolymer at least one reactive group R^3 is replaced by the binding group, at least one reactive group R^3 is replaced by the affinity tag and/or at least one reactive group R^3 is replaced by the imaging probe,

and wherein the binding group is selected from nitrilotriacetic acid and tris(nitriloacetic) acid.

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

3. The macromolecular conjugate according to any one of the preceding claims, characterized in that the binding group is bound to the synthetic copolymer via a linker based on polyethylene glycol, peptide, preferably a peptide having a molecular weight in the range of 100 to 5000 g/mol, or nucleic acid, preferably a nucleic acid containing 1 to 40 nucleotides, or oligosaccharide, preferably an oligosaccharide containing 1 to 40 monosaccharides.

4. The macromolecular conjugate according to any one of the preceding claims, characterized in that the affinity tag is present and it is selected from the group consisting of biotin, FLAG tag, His-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.

5. The macromolecular conjugate according to claim 1, characterized in that the imaging probe is present and 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.

6. Use of the macromolecular conjugate according to any one of the preceding claims for identification, visualization, quantification or isolation of proteins *in vitro*.

7. Use of the macromolecular conjugate according to any one of claims 1 to 5 in an immunochemical method, preferably selected from ELISA, Wester blotting and modifications thereof, flow cytometry, immunoprecipitation, immunocytochemistry.

8. Use of the macromolecular conjugate according to claim 1 for identification, visualization, quantification or isolation of proteins containing the affinity tag His-tag.