CLAIMS

1. A bispecific anti-tumor antigen/anti-HSG antibody, comprising at least one binding site specifically recognizing a tumor antigen and a binding site specifically recognizing HSG, comprising

- a light chain variable (VL) domain comprising a sequence selected from the group consisting of SEQ ID NOs 17 and 19, with glutamine at position 100 (Q100), glutamic acid at position 105 (E105) and isoleucine at position 106 (I106) according to Kabat numbering, and
- a heavy chain variable (VH) domain comprising a sequence selected from the group consisting of SEQ ID NOs 4, 6, 8, and 10 with arginine at position 19 (R19) according to Kabat numbering.

2. The antibody of claim 1, comprising a single-chain variable fragment (scFv) specifically recognizing HSG of the formula selected from the group consisting of VH-linker-VL-linker, VL-linker-VH-linker, wherein the linker comprises SEQ ID NO 39 or SEQ ID NO 42.

3. The antibody of claim 1, comprising VL and VH domains specifically recognizing HSG, wherein the VL domain is C-terminally connected to SEQ ID NO 30, and the VH domain is C-terminally connected to SEQ ID NO 38.

4. The antibody of any one of claims 1 to 3, comprising a Fc region having SEQ ID 31 comprising asymmetric mutations in each CH3 domain enabling heterodimerization of two CHs from different antibodies, specifically one CH comprises „knob“ mutations T366W and S354C and one CH comprises „hole“ mutations T366S. L368A, Y407V and Y349C according to EU numbering index.

5. The antibody of any one of claims 1 to 4, comprising a variant Fc region with reduced or eliminated effector functions and/or FcRn binding, specifically a variant Fc region having amino acid substitutions at any one or more of positions E233, L234, L235, G236, G237, P238, I253, D265, S267, H268, N297, S298, T299, H310, E318, L328, P329, A330, P331, H435 of SEQ ID 31 according to EU numbering index, and optionally an aglycosylated Fc region.

6. The antibody of any one of claims 1 to 5, wherein the anti-tumor antigen is selected from the group consisting of oxMIF, Mesothelin (MSLN), and Folate Receptor alpha (FRα), specifically the anti-tumor antigen is oxMIF.

7. The antibody of claim 6, wherein the binding site specifically recognizing oxMIF comprises,

- a light chain variable domain comprising SEQ ID NO 27, or a light chain variable domain comprising SEQ ID NO 27 and further comprising amino acid substitutions M30L and/or P80S, and
- a heavy chain variable domain comprising SEQ ID NO 46, specifically with amino acid substitutions L5Q and/or W97Y,

wherein the amino acid positions are numbered according to Kabat.

8. The antibody of any one of claims 1 to 7, selected from the group consisting of Fab-scFv-Fc, CrossMab, (scFv)2-Fc, scFv/scFv-Fc, Fab/(scFv)2-Fc, Fab/Fab-scFv-Fc (= IgG-central scFv), Fab/Fab-crossFab-Fc, Fab/crossFab-Fc, IgG-scFv, and IgG-(scFv)2.

9. The antibody of any one of claims 1 to 8, wherein the antibody is an anti-oxMIF/anti-HSG CrossMab antibody variant comprising SEQ ID NOs 27, 37, 28, 29, 36, 17, 30, 4, 38, and 33, or comprising SEQ ID NOs 27, 37, 28, 29, 36, 19, 30, 6, 38, and 33.

10. Use of the antibody of any one of claims 1 to 9 in the manufacture of a medicament for the treatment or detection of malignancies, wherein said antibody is to be administered to a subject in a first step and a HSG moiety is to be administered in a second step, wherein said HSG moiety binds to the antibody.

11. The use of claim 10, wherein said HSG moiety is conjugated to or labeled with one or more diagnostic and/or therapeutic agents, specifically said HSG moiety comprises one or more HSG haptens, one or more diagnostic and/or therapeutic agents, and a chelator.

12. The antibody of any one of claims 1 to 9, wherein said antibody is bound to a HSG moiety conjugated to or labeled with one or more diagnostic and/or therapeutic agents, specifically said HSG moiety comprises one or more HSG haptens, one or more diagnostic and/or therapeutic agents, and a chelator, specifically the therapeutic agent is a radionuclide or a cytotoxic drug; and the diagnostic agent is a radionuclide.

13. The antibody of claim 12, wherein the chelator binds a radionuclide and is specifically selected from DOTA, DTPA, deferoxamine B (DFO) and DFO*, specifically the radionuclide is selected from the group consisting of ^{11}C, ^{13}N, ^{15}O, ^{18}F, ^{32}P, ^{33}P, ^{47}Sc, ^{59}Fe, ^{64}Cu, ^{67}Cu, ^{67}Ga, ^{75}Se, ^{77}As, ^{89}Sr, ^{89}Zr, ^{90}Y, ^{99}mTc, ^{99}Mo, ^{103}Pd, ^{105}Rh, ^{109}Pd, ^{111}Ag,^{111}In, ^{123}I, ^{124}I, ^{125}I, ^{131}I, ^{140}La, ^{142}Pr, ^{143}Pr,^{149}Tb, ^{149}Pm, ^{153}Sm, ^{159}Gd, ^{161}Tb, ^{165}Dy, ^{166}Dy, ^{166}Ho, ^{169}Yb, ^{169}Er, ^{175}Yb,^{177}Lu, ^{186}Re, ^{188}Re, ^{189}Re, ^{192}Ir, ^{193}mPt, ^{195}mPt, ^{194}Ir, ^{198}Au, ^{199}Au, ^{211}At, ^{211}Pb, ^{212}Pb, ^{212}Bi, ^{213}Bi, ^{211}At, ^{223}Ra, ^{225}Ac, and ^{227}Th.

14. A pharmaceutical composition comprising the antibody of any one of claims 1 to 9 together with a pharmaceutical excipient, specifically the pharmaceutical composition is formulated to be administered intravenously.

15. Use of the pharmaceutical composition of claim 14 in the manufacture of a medicament for the treatment of a patient suffering from cancer, specifically the treatment of solid tumors, more specifically the treatment of colorectal cancer, ovarian cancer, breast cancer, prostate cancer, pancreas cancer, and lung cancer.

16. The antibody of any one of claims 1 to 9 or the pharmaceutical composition of claim 14 for use in therapy.