Genetic encoding of targeted MRI contrast agents for tumor imaging

Supplementary Information

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Supplementary Figures

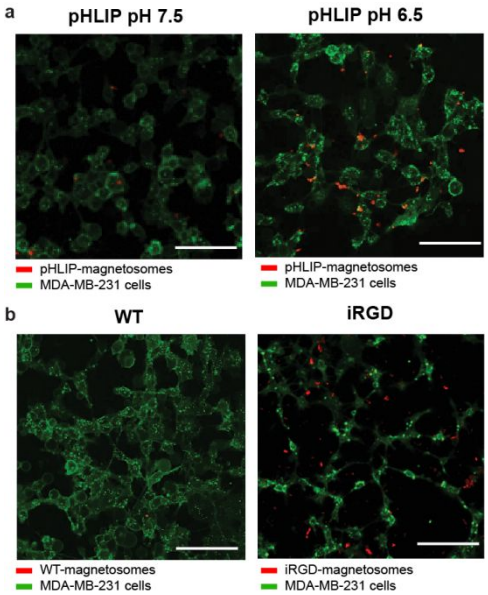

Figure S1: Confocal images of *in vitro* binding studies. a) pHLIP and wild-type magnetosomes were fluorescently labeled with a membrane dye (red) and incubated with MDA-MB-231 breast cancer cells at standard (pH 7.5) and low pH (pH 6.5). Increased binding for pHLIP magnetosomes at low pH can be observed in confocal fluorescence images of cells (green) with magnetosomes (red) shown on the right (scale bars = 100 µm). **b)** iRGD magnetosomes incubated with the same cell line, known to express αv integrins, showed increased selectivity to these cells compared to wild-type magnetosomes in confocal images (scale bars = 100 µm).

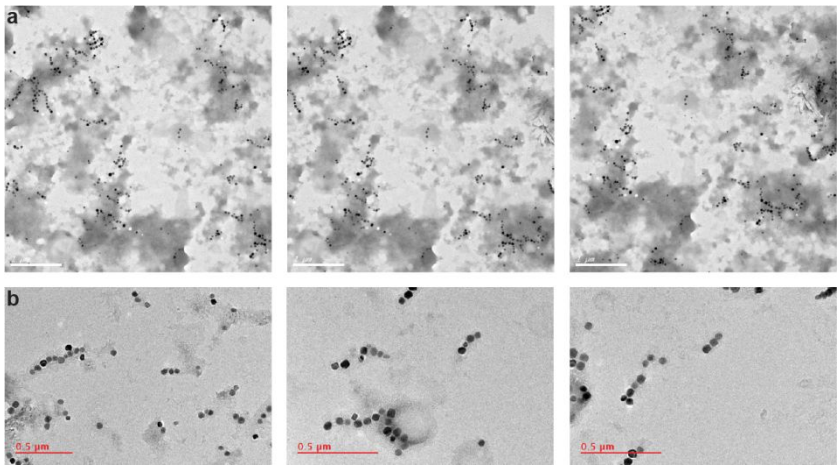

Figure S2. Transmission electron micrographs of magnetosomes after sonication. A series of transmission of electron micrographs of samples after short sonication durations of up to 1 minute is shown in **a)** (scale bars = 1 µm) and **b)** (scale bars = 0.5 µm), displaying well-dispersed magnetosomes.

Supplementary Table S1. DNA sequence of the plasmid vector construct.

Construct name	DNA Sequence
pMGA vector	GGGTCCCCAATAATTACGATTTAAATTGGCGGGATCCAATCGCTCGAGCGCGAGGTCACAATTGGAGATGATCCGCCAGCGCCGAAGCCATC ATAACTGCATTGAATAATTCAAAGTGCATTGAATAAGGCAGGGTGCATAAGGCGCAGCCTTTCGATTAACTCCATTTCCTGCGGCGACAACG TCGCCGCTTGCCCCCCCGACGGGGGTCAAGCGAGGCACAGGGACCCGCCGCCTCTTGGCGGTGGGTGGCCGCAGCTTGACGCCCGAACACTC CGCCGCCCAACCCTGCCTGCTCTCCTCTGTTCAATGAAATTGAACGGAGGAGATGCCTCCCGGCGAGGGCCTTTCTTTCTTGCATAACGTTC ATGCTACGTTCCAACGGTTATACCGTATGAGCGTCGAACTGTATAATCGTTGAACAGTCGAACCATCCCCCCGCGCCAGCGCGGGGAGCAGG GATGGGTTCGGGGGCCGGAAGTTAGGCAAATCGCGGAGCCGTGGCGCCCTCGGTACATCCGCGAAATCGGTTGACACTTTGCCCCCAGAACG GCTGCAACCTACCGCTTGGCGACAGCCGCGTGACGGTACTTTTCCGCTGTGGATTCGGACACGAATATCTGTTCAGCAGCCAGGGCGCGGGC GATCTGGCGACGGCCGAGGCCCTGATGGGCCAATTCTGTGATCCGGTCTATGACCGCTTGGCTCATCGGCACCCGAGGACCGCCGATACCAG ATTGGCGCACATCGCCCATGGTGGGTGGAACCGAGGGAGCCGGAGCCGGTGCAGATTTCTGCACAGTTGGTTCACGCCGTCGTTCTAGCGCA TCGAGACGCTGCACGATCACGGCGAGCTGATCGTTGACGTATTGTCGCTCCTCGGACTGCGCAATTGTGATCAGAAATTCGAGGAGCTCGGC CACGGTGACGCCGCGTCGAAGGGCCATAGCCTGTATGTGGTCGCGGACCGCATCAGGACAGCGAATCGTCCATCTCGTGTCTGACACATTCC CGGTTTTTGTCTGACTCATCGTCGCCCCCAATGTCTGACAGATTCGAGAAAGAGTCATACCGGCTAACGCGAACGCTGACAACGAATGTCTG ACAAAATGATGATTACGTCAGACATTGATGTCTGCCTAAATCGCAATAGTGTCTGACATGGTTTTTGGCGTTCCGTATATAAAATATGCGCC AAAATCTAGTGCGTCAGCCAAACGGCAAACGCAACCAGTTGACACCATTTCCGGTTTTATGAGACTGTGAAAAGACCAAAGGCCGCCTTGCG GCGGCCTAGGTGATTGTGGTCCCGGCGACCAAGGCTGCGAAAACTTGGCGGTCCAGCAGCAGAGGAAGCCCGTTTGAAAGGTCCGGCTTGCG CCGGAACCACCTAATGACAATAGCAATTCGCCGCACAGTTTTCAACACCCAGCCCGCCATGATTCGCGGCGGCGTTGAACGTTGAACAACAG ACGTCTCAAACAGACACCCGCAAACGCGAACGGTATCGGTTGCAGGATGCAGCCGCTGAACTGCTGCCGGATTATCGGGTGCGGCATTGCCA CCGCTCAATTGGATGTGGCTGTGGCGAGTTGGTCAGCGTTGTTACCAATGGGCAGTCGGCCAATTTCAAAGGCGTGCAGACCTGCGGCTCGG TCTGGCACTGCCCAATCTGTTCGGCAAAAATCAGCAATGTTCGGCGCGGCGAGCTGAACGAGCTGCTGCGCTGGGGGCGGGAGAGGGAGCTG ATCCCGCTGATGGTGACGCTGACAGGCCATCACAATGCACGGATGAGCCTCGCTGAATGTCTGACGGTGATGAAGAAGGCCAAGCAGAGCCT TCACCAGTCTGGCCCATGGAAGCGCCATGTTGGCCCGGTGGTCGAAGGGCACGTCACGGCAACGGAGGTCAATCGGTCACGCCGCCATGGCT GGCACGTCCATTTTCACGTCCTGATGCTGATTGAGGCCGCCAGCGAGGCCGAAGCGATTGCGCTCGTGACCCGACACCTCGAACCTGAATGG CTCCGGCAGCTTGAGCGCCAAGGCAGCTGGGGCGGCGAACATGCGTTAGACGTCCAGGGCGCAGCCGATGCGGATCGGTATGTGGCCAAGTG GGGCGCGGCTGAGGAATTGGCTCTGTCGGGCGAAAAGCGGGCGCGCGGCGACGCCGAAATTAAGGGTCAAACGCCGTGGGAATTGTTGGCCG CTGCGGCTGATGGTGACGTCCAGGCTGGCCGCGATTTTGTGGAGTACGCGACCCTGTTTCATGGCAAACGCCAGCTCGTTTGGTCGCGAGGA CTGAAAGAGCGTGTCGGCCTCAAGGTGGTGGAAGACGACGAGGCCGCCGGCGAGCTGGAGGATGTCGCAGATAGCGCCATCAACGAAGTGGC CGTGTTGCCGAGGCCGACTTGGCGTCACATCGTCCGGCGCAGGCTCCGCGCGGATCTGCTGGCCGCCGCTCGTGATGACGGATTCGATGGCG TCGCGCGGCTGCTCAATGAGCATGGCATCGGCGGAGCTATGCCCGGCGGCTGGCGACCAATGCTTAGCGAATATACCGAGCATATTGCGATG GCTGCGTGACTCTTTTGGCCCACCGGCCTGAGGGAAATTTGCCTCGCAGAGCTCACGATAATTTGACAAGGGCCGTAGGCCCGCAGGCAAAT TGTCTAGTGAGTGTACAATTTTCAAATTCGAAGGTTATTGTAGAGCTGACGCTCTCAAGGTGATGACGCCTATGGCTGACGATTCTGGCGTC 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	ACCCGCGAGCGGGTGTTCCTTCTTCACTGTCCCTTATTCGCACCTGGCGGTGCTCAACGGGAATCCTGCTCTGCGAGGCTGGCCGGCTACCG CCGGCGTAACAGATGAGGGCAAGCGGATGGCTGATGAAACCAAGCCAACCAGGAAGGGCAGCCCACCTATCAAGGTGTACTGCCTTCCAGAC GAACGAAGAGCGATTGAGGAAAAGGCGGCGGCGGCCGGCATGAGCCTGTCGGCCTACCTGCTGGCCGTCGGCCAGGGCTACAAAATCACGGG CGTCGTGGACTATGAGCACGTCCGCGAGCTGGCCCGCATCAATGGCGACCTGGGCCGCCTGGGCGGCCTGCTGAAACTCTGGCTCACCGACG ACCCGCGCACGGCGCGGTTCGGTGATGCCACGATCCTCGCCCTGCTGGCGAAGATCGAAGAGAAGCAGGACGAGCTTGGCAAGGTCATGATG GGCGTGGTCCGCCCGAGGGCAGAGCCATGACTTTTTTAGCCGCTAAAACGGCCGGGGGGTGCGCGTGATTGCCAAGCACGTCCCCATGCGCT CCATACAGTTAGGGCGCGCCCAGCTG
Ptac/Lacl-mamC[a]	TCTAGGGCGGCGGATTTGTCCTACTCAGGAGAGCGTTCACCGACAAACAACAGATAAAACGAAAGGCCCAGTCTTTCGACTGAGCCTTTCGT TTTATTTGATGCCTTTAATTAAAGCGGATAACAATTTCAGAATTCGCGCTCACTGCCCGCTTTCCAGTCGGGAAACCTGTCGTGCCAGCTGC ATTAATGAATCGGCCAACGCGCGGGGAGAGGCGGTTTGCGTATTGGGCGCCAGGGTGGTTTTTCTTTTCACCAGTGAGACGGGCAACAGCTG ATTGCCCTTCACCGCCTGGCCCTGAGAGAGTTGCAGCAAGCGGTCCACGCTGGTTTGCCCCAGCAGGCGAAAATCCTGTTTGATGGTGGTTA ACGGCGGGATATAACATGAGCTGTCTTCGGTATCGTCGTATCCCACTACCGAGATATCCGCACCAACGCGCAGCCCGGACTCGGTAATGGCG CGCATTGCGCCCAGCGCCATCTGATCGTTGGCAACCAGCATCGCAGTGGGAACGATGCCCTCATTCAGCATTTGCATGGTTTGTTGAAAACC GGACATGGCACTCCAGTCGCCTTCCCGTTCCGCTATCGGCTGAATTTGATTGCGAGTGAGATATTTATGCCAGCCAGCCAGACGCAGACGCG CCGAGACAGAACTTAATGGGCCCGCTAACAGCGCGATTTGCTGGTGACCCAATGCGACCAGATGCTCCACGCCCAGTCGCGTACCGTCTTCA TGGGAGAAAATAATACTGTTGATGGGTGTCTGGTCAGAGACATCAAGAAATAACGCCGGAACATTAGTGCAGGCAGCTTCCACAGCAATGGC ATCCTGGTCATCCAGCGGATAGTTAATGATCAGCCCACTGACGCGTTGCGCGAGAAGATTGTGCACCGCCGCTTTACAGGCTTCGACGCCGC TTCGTTCTACCATCGACACCACCACGCTGGCACCCAGTTGATCGGCGCGAGATTTAATCGCCGCGACAATTTGCGACGGCGCGTGCAGGGCC AGACTGGAGGTGGCAACGCCAATCAGCAACGACTGTTTGCCCGCCAGTTGTTGTGCCACGCGGTTGGGAATGTAATTCAGCTCCGCCATCGC CGCTTCCACTTTTTCCCGCGTTTTCGCAGAAACGTGGCTGGCCTGGTTCACCACGCGGGAAACGGTCTGATAAGAGACACCGGCATACTCTG CGACATCGTATAACGTTACTGGTTTCACATTCACCACCCTGAATTGACTCTCTTCCGGGCGCTATCATGCCATACCGCGAAAGGTTTTGCAC CATTCGATGGTGTCAACGTAAATGCATGCCGCTTCGCCTTCGCGCGCGAATTGCAGGTACCATTTATCAGGGTTATTGTCTCATGAGCGGAT ACATATTTGAATGTATTTAGAAAAATAAACAAATAGGGGTTCCGCGCACATTTCCCCGAAAAGTGCCACCTGACGTCTAAGAAACCATTATT ATCATGACATTAACCTATAAAAATAGGCGTATCACGAGGCCCTTTCGTCTTCACCTCGAGAAAATTTATCAAAAAGAGTGTTGACTTGTGAG CGGATAACAATGATACTTAGATTCAATTGTGAGCGGATAACAATTTCACACAATCGATAGCTGTCACCGGATGTGCTTTCCGGTCTGATGAG TCCGTGAGGACGAAACAGCCTCTACAAATAATTTTGTTTAATCTAGAAATAATTTTGTTTATCTCTCGAGGAGGATTCGCCATGCCCTTTCA CCTTGCCCCCTATCTGGCGAAATCCGTTCCCGGCGTCGGCGTTCTCGGCGCCCTGGTCGGCGGCGCCGCCGCCTTGGCCAAGAACGTCCGCC TCCTGAAGGAAAAGCGCATCACCAATACCGAAGCGGCCATCGATACCGGCAAGGAAACCGTCGGCGCCGGCCTGGCCACCGCGCTTTCCGCC GTGGCCGCGACCGCCGTCGGCGGCGGCCTGGTTGTATCGCTGGGCACCGCCTTGGTGGCCGGCGTTGCCGCCAAATATGCCTGGGATCGCGG CGTCGATCTGGTCGAGAAGGAACTGAACCGCGGCAAAGCTGCCAACGGCGCTTCCGACGAGGACATCTTGCGGGACGAACTGGCCTGATAAG CTTGCGGCCGCGTCGTGACTGGGAAAACCCTGGCGACTAGTCTTGGACTCCTGTTGATAGATCCAGTAATGACCTCAGAACTCCATCTGGAT TTGTTCAGAACGCTCGGTTGCCGCCGGGCGTTTTTTATTGGTGAGAATCCAG

[a]DNA sequence colors corresponds to terminators (red), spacers (black), lacI-CDS (blue), promoter (green), ribozyme insulators (purple), and mamC-CDS (orange).

Supplementary Table S2. DNA sequence of the mamC-peptide CDS

CDS	DNA Sequence[a]
mamC-his	ATGCCCTTTCACCTTGCCCCCTATCTGGCGAAATCCGTTCCCGGCGTCGGCGTTCTCGGCGCCCTGGTCGGCGGCGCCGCCGCC TTGGCCAAGAACGTCCGCCTCCTGAAGGAAAAGCGCATCACCAATACCGAAGCGGCCATCGATACCGGCAAGGAAACCGTCGGC GCCGGCCTGGCCACCGCGCTTTCCGCCGTGGCCGCGACCGCCGTCGGCGGCGGCCTGGTTGTATCGCTGGGCACCGCCTTGGTG GCCGGCGTTGCCGCCAAATATGCCTGGGATCGCGGCGTCGATCTGGTCGAGAAGGAACTGAACCGCGGCAAAGCTGCCAACGGC GCTTCCGACGAGGACATCTTGCGGGACGAACTGGCCGCTGGTGGATCCCATCACCATCACCATCACCATCACCATTGA
mamC-pHLIP	ATGCCCTTTCACCTTGCCCCCTATCTGGCGAAATCCGTTCCCGGCGTCGGCGTTCTCGGCGCCCTGGTCGGCGGCGCCGCCGCC TTGGCCAAGAACGTCCGCCTCCTGAAGGAAAAGCGCATCACCAATACCGAAGCGGCCATCGATACCGGCAAGGAAACCGTCGGC GCCGGCCTGGCCACCGCGCTTTCCGCCGTGGCCGCGACCGCCGTCGGCGGCGGCCTGGTTGTATCGCTGGGCACCGCCTTGGTG GCCGGCGTTGCCGCCAAATATGCCTGGGATCGCGGCGTCGATCTGGTCGAGAAGGAACTGAACCGCGGCAAAGCTGCCAACGGC GCTTCCGACGAGGACATCTTGCGGGACGAACTGGCCGCTGCGGAACAGAACCCGATTTATTGGGCGCGCTATGCGGATTGGCTG TTTACCACCCCGCTGCTCCTGCTGGATCTGGCGCTCCTGGTGGATGCGGATGAAGGCACCTGA
mamC-iRGD	ATGCCCTTTCACCTTGCCCCCTATCTGGCGAAATCCGTTCCCGGCGTCGGCGTTCTCGGCGCCCTGGTCGGCGGCGCCGCCGCC TTGGCCAAGAACGTCCGCCTCCTGAAGGAAAAGCGCATCACCAATACCGAAGCGGCCATCGATACCGGCAAGGAAACCGTCGGC GCCGGCCTGGCCACCGCGCTTTCCGCCGTGGCCGCGACCGCCGTCGGCGGCGGCCTGGTTGTATCGCTGGGCACCGCCTTGGTG GCCGGCGTTGCCGCCAAATATGCCTGGGATCGCGGCGTCGATCTGGTCGAGAAGGAACTGAACCGCGGCAAAGCTGCCAACGGC GCTTCCGACGAGGACATCTTGCGGGACGAACTGGCCGCTGGTGGATCCTGCCGTGGCGACAAGGGTCCGGATTGCTGA

[a]DNA sequence colors corresponds to mamC (orange), AGGS linker (blue), and peptide tag (green).