

Supplementary Materials:

File S1

Synthetic genes used for optiGag-mRuby3IN

NL4-3 Codon Optimized Gag fragment:

ATCTCGAGCTCAAGCTTCGAATTCGCCACCATGGGTGCGCGAGCGTCCGTGCTGAGTGGCGGCGAACTCGAC  
AAATGGGAAAAGATCCGGCTCAGACCTGGGGGAAAGAAACAATACAAGCTTAAACACATCGTTTGGGCCAG  
CCGCGAGCTGGAGAGGTTTGCCGTTAATCCTGGGCTTCTGGAAACGAGTGAAGTTGCAGGCAAATTCTCGG  
ACAACCTCAGCCCTCTCTCCAACTGGTTCTGAAGAACTCCGCAGTTTGTACAATACTATTGCGGTTCTTTATT  
GTGTCCACCAACGCATAGACGTGAAAGATACTAAGGAGGCGCTGGACAAAATCGAAGAAGAGCAGAATAA  
GAGCAAAAAAAAAAGCCCAGCAGGCCGCGGCTGACACCGGCAACAATAGCCAGGTCAGTCAAACTACCCC  
ATTGTCCAGAATCTTCAAGGACAAATGGTACATCAAGCGATCTCTCCCCGAACATTGAATGCCTGGGTGAAG  
GTCGTGAAGAAAAAGCCTTTAGCCAGAAGTCATTCCGATGTTTTCTGCACTTTCTGAGGGCGCAACGCCCG  
AGGACCTGAACACTATGCTTAATACAGTAGGCGGACATCAAGCAGCAATGCAAATGCTGAAAGAGACCATT  
AATGAGGAGGCTGCCGAGTGGGATCGGCTTACCCTGTGCATGCAGGTCCGATTGCCCCGGCCAGATGCGC  
GAGCCAAGAGGATCAGATATCGCTGGAACAACCTTCTACGTTGCAAGAGCAAATTGGTTGGATGACACATAAC  
CCTCCATTCCCGTGGGCGAGATTTACAAGAGGTGGATAAATACTGGGTTTGAATAAAAATTGTGAGAATGTACT  
CACCAACCTCAATCTTGGACATAAGACAAGGTCCAAAGGAGCCCTTCAGAGACTACGTGACAGGTTTTTACA  
AGACCCTCCGAGCTGAACAGGCTAGCCAGGAAGTCAAGAATTGGATGACCGAAACACTTCTTGTTCAAAATG  
CAAATCCAGATTGTAAGACTATCCTGAAGGCTCTGGGACCTGGAGCCACGTTGGAGGAAATGATGACCGCTT  
GTCAGGGAGTAGGCGGGCCCGTCAAAAAGCTCGGGTCTGGCTGAAGCAATGAGCCAGGTCACCAACCCG  
GCCACCATCATGATCCAAAAGGGGAATTTCCGAAATCAGCGAAAGACTGTAAAGTGTTC AATTGTGGGAAA  
GAGGGGCACATCGCAAAGAATTGTCGAGCTCCACGAAAAAAGGGGTGTTGGAAATGTGGAAAGGAAGGGC  
ATCAAATGAAGGATTGCACGGAAAGGCAAGCTAATTTCTTGGGTAATAATTTGGCCCTTCATAAGGGACGAC  
CAGGGAACCTTCTCCAATCCAGGCCTGAGCCAACAGCCCCGCCGAGGAATCTTTCAGGTTCCGGCAGGAGA  
CGACTACACCAGCCAGAAACAGGAACCAATTGACAAGGAGTTGTATCCTCTGGCATCCCTTCGGAGTTTGT  
TCGTTTCAGACCCCTCGTCAAAAG

mRuby3IN fragment

GACCCCTCGTCAACAAGGGGAAGTAGATAAATTAGGTGCTGGTATCCGTAAAGTACTATTTTTAGATGGAATA  
GATATGGTGTCTAAGGGCGAAGAGCTGATCAAGGAAAATATGCGTATGAAGGTGGTCATGGAAGGTTCCGGT  
AACGGCCACCAATTCAAATGCACAGGTGAAGGAGAAGGCAGACCGTACGAGGGAGTGCAAACCATGAGGA  
TCAAAGTCATCGAGGGAGGACCCCTGCCATTTGCCCTTGGACATTCTTGCCACGTCGTTTCATGTATGGCAGCCG  
TACTTTTATCAAGTACCCGGCCGACATCCCTGATTTCTTTAAACAGTCCTTTCCGAGGGTTTTACTTGGGAAA  
GAGTTACGAGATACGAAGATGGTGGAGTTCGTACCCGTCACGCAGGACACCAGCCTTGAGGATGGCGAGCTC  
GTCTACAACGTCAAGGTCAGAGGGGTAACCTTTCCCTCCAATGGTCCCCTGATGCAGAAGAAGACCAAGGGT  
TGGGAGCCTAATACAGAGATGATGTATCCAGCAGATGGTGGTCTGAGAGGATACACTGACATCGCACTGAAA  
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CCGCTGGCTCCGCTGCTGGTTCTGGCGAATTTCTTTTATAGATGGAATAGATAAGGCCCAAGAAGAACATGAGA  
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CCAGCTGTGATAAATGTCAGCTAAAAGGGGAAGCCATGCATGGACAAGTAGACTGTAGCCCAGGAATATGG  
CAGCTAGATTGTACACATTTAGAAGGAAAAGTTATCTTGGTAGCAGTTCATGTAGCCAGTGGATATATAGAA  
GCAGAAGTAATTCCAGCAGAGACAGGGCAAGAAACAGCATACTTCTTAAAATTAGCAGGAAGATGGCC  
AGTAAAAACAGTACATACAGACAATGGCAGCAATTTACCAGTACTACAGTTAAGGCCGCTGTTGGTGGGG  
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AATTAAGAAAATTATAGGACAGGTAAGAGATCAGGCTGAACATCTTAAGACAGCAGTACAAATGGCAGTA  
TTCATCCACAATTTTAAAAGAAAAGGGGGGATTGGGGGTACAGTGCAGGGGAAAGAATAGTAGACATAAT  
AGCAACAGACATAAACTAAAGAATTACAAAAACAATTACAAAAATTCAAATTTTCGGGTTTATTACA  
GGACAGCAGAGATCCAGTTTGGAAAGGACCAGCAAAGCTCCTCTGGAAAGGTGAAGGGGCAGTAGTAATA

CAAGATAATAGTGACATAAAAAGTAGTGCCAAGAAGAAAAGCAAAGATCATCAGGGATTATGGAAAACAGA  
TGGCAGGTGATGATTGTGTGGCAAGTAGACAGGATGAGGATTAAGCGGCCGCGACTCTAGATCATAATCAG

sfGFP-IN fragment

GGTGCTGGTATCCGTAAAGTACTATTTTTAGATGGAATAGATATGAGCAAAGGAGAAGAAGCTTTTCACTGGA  
GTTGTCCCAATTCTTGTGAATTAGATGGTGATGTTAATGGGCACAAATTTTCTGTCCGTGGAGAGGGTGAAG  
GTGATGCTACAAACGGAAAACCTCACCTTAAATTTATTTGCACTACTGGAAAACCTACCTGTTCCATGGCCAA  
ACTTGTCACTACTCTGACCTATGGTGTTCAATGCTTTTTCCCGTTATCCGGATCACATGAAACGGCATGACTTTT  
TCAAGAGTGCCATGCCCGAAGGTTATGTACAGGAACGCACTATATCTTTCAAAGATGACGGGACCTACAAGA  
CGCGTGCTGAAGTCAAGTTTGAAGGTGATACCCTTGTTAATCGTATCGAGTTAAAAGGTATTGATTTTAAAGA  
AGATGGAAACATTCTCGGACACAACTCGAGTACAACCTTAACTCACACAATGTATACATCACGGCAGACAA  
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TTGGTAGCAGTTCATGTAGCCAGTGGATATATAGAAGCAGAAGTAATTCCAGCAGAGACAGGGCAAGAAAC  
AGCATACTTCTCTTAAAATTAGCAGGAAGATGGCCAGTAAAACAGTACATACAGACAATGGCAGCAATTT  
CACCAGTACTACAGTTAAGGCCGCC

mWasabi-IN fragment

GGTGCTGGTATCCGTAAAGTACTATTTTTAGATGGAATAGATATGGTGAGCAAGGGCGAGGAGACCACAATG  
GGCGTAATCAAGCCCGACATGAAGATCAAGCTGAAGATGGAGGGCAACGTGAATGGCCACGCCTTCGTGAT  
CGAGGGCGAGGGCGAGGGCAAGCCCTACGACGGCACCAACACCATCAACCTGGAGGTGAAGGAGGGAGCC  
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ACGACATCCCCAACTACTTCAAGCAGTCCTTCCCCGAGGGCTACTCTTGGGAGCGCACCATGACCTTCGAGG  
ACAAGGGCATCGTGAAGGTGAAGTCCGACATCTCCATGGAGGAGGACTCCTTCATCTACGAGATACACCTCA  
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CCACCGCGTTGACTTCAAGACCATCTACAGGGCCAAGAAGGCGGTGAAGCTGCCCGACTATCACTTTGTGGA  
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GCAACTCCACCGACGGCATGGACGAGCTGTACAAGAAGGGATCCGCTGGCTCCGCTGCTGGTTCTGGCGAAT  
TCTTTTTAGATGGAATAGATAAGGCCCAAGAAGAACATGAGAAATATCACAGTAATTGGAGAGCAATGGCTA  
GTGATTTTAACTACCACCTGTAGTAGCAAAAGAAATAGTAGCCAGCTGTGATAAATGTCAGCTAAAAGGGG  
AAGCCATGCATGGACAAGTAGACTGTAGCCAGGAATATGGCAGCTAGATTGTACACATTTAGAAGGAAAA  
GTTATCTTGGTAGCAGTTCATGTAGCCAGTGGATATATAGAAGCAGAAGTAATTCCAGCAGAGACAGGGCAA  
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CAATTTACCAGTACTACAGTTAAGGCCGCC

mNeonGreen-IN fragment

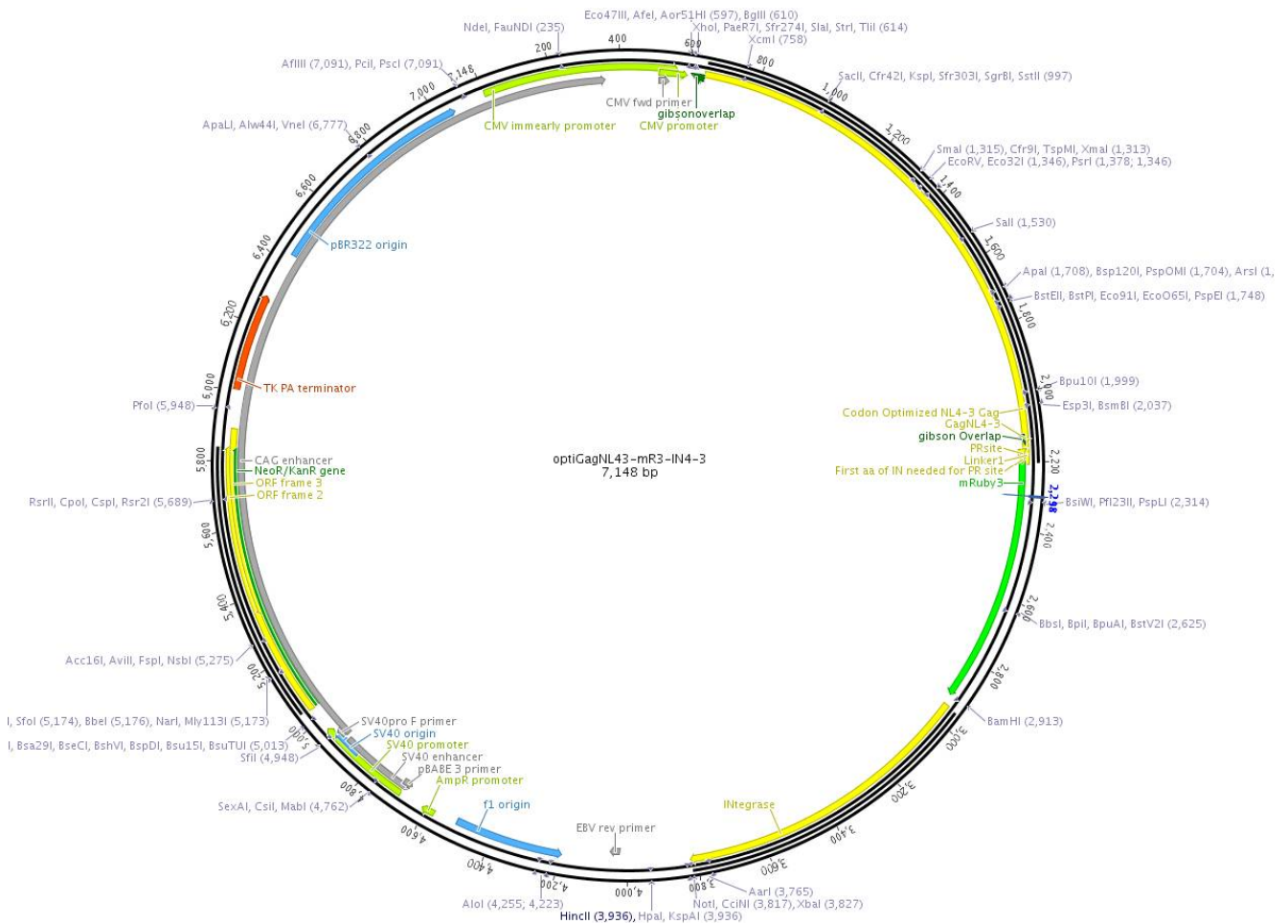
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AGGGCACCGGCAATCCAAATGATGGTTATGAGGAGTTAACTGAAGTCCACCAAGGGTGACCTCCAGTTCT  
CCCCCTGGATTCTGGTCCCTCATATCGGGTATGGCTTCCATCAGTACCTGCCCTACCCTGACGGGATGTCGCT  
TTCCAGGCCCGCATGGTAGATGGCTCCGGATACCAAGTCCATCGCACAATGCAGTTTGAAGATGGTGCCTCC  
CTTACTGTAACTACCGCTACACCTACGAGGGAAGCCACATCAAAGGAGAGGCCAGGTGAAGGGGACTGG  
TTTCCCTGCTGACGGTCTGTGATGACCAACTCGCTGACCGCTGCGGACTGGTGCAGGTCAAGAAGACTTAC  
CCCAACGACAAAACCATCATCAGTACCTTAAAGTGGAGTTACACCACTGGAAATGGCAAGCGCTACCGGAG  
CACTGCGCGGACCACCTACACCTTTGCCAAGCCAATGGCGGCTAACTATCTGAAGAACCAGCCGATGTACGT  
GTTCCGTAAGACGGAGCTCAAGCACTCCAAGACCGAGCTCAACTTCAAGGAGTGGCAAAGGCCCTTACC  
ATGTGATGGGCATGGACGAGCTGTACAAGAAGGGATCCGCTGGCTCCGCTGCTGGTTCTGGCGAATTCTTTTT  
AGATGGAATAGATAAGGCCCAAGAAGAACATGAGAAATATCACAGTAATTGGAGAGCAATGGCTAGTGATT

TTAACCTACCACCTGTAGTAGCAAAGAATAGTAGCCAGCTGTGATAAATGTCAGCTAAAAGGGGAAGCC  
 ATGCATGGACAAGTAGACTGTAGCCAGGAATATGGCAGCTAGATTGTACACATTTAGAAGGAAAAGTTATC  
 TTGGTAGCAGTTCATGTAGCCAGTGGATATATAGAAGCAGAAGTAATTCCAGCAGAGACAGGGCAAGAAAC  
 AGCATACTTCCTCTTAAATTAGCAGGAAGATGGCCAGTAAAAACAGTACATACAGACAATGGCAGCAATTT  
 CACCAGTACTACAGTTAAGGCCGCC

**File S2**

**Plasmids Maps:**

pOptiGag-mRuby3IN (all other optiGag-FluoIN plasmids with other fluorescent proteins share the same construct):



psPAX2-sfGFPIN (all other psPAX2-FluoIN plasmids with other fluorescent proteins share the same construct)

