SEQUENCE LISTING

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<120> ENGINEERED HIGH-AFFINITY HUMAN T CELL RECEPTORS

<130> IMMU-003/02WO

<150> US 61/907,887
<151> 2013-11-22

<160> 34

<170> PatentIn version 3.5

<210> 1
<211> 115
<212> PRT
<213> Homo sapiens

<400> 1

Asp Val Lys Val Thr Gln Ser Ser Arg Tyr Leu Val Lys Arg Thr Gly
1 5 10 15

Glu Lys Val Phe Leu Glu Cys Val Gln Asp Met Asp His Glu Asn Met
20 25 30

Phe Trp Tyr Arg Gln Asp Pro Gly Leu Gly Leu Arg Leu Ile Tyr Phe
35 40 45

Ser Tyr Asp Val Lys Met Lys Glu Lys Gly Asp Ile Pro Glu Gly Tyr
50 55 60

Ser Val Ser Arg Glu Lys Lys Glu Arg Phe Ser Leu Ile Leu Glu Ser
65 70 75 80

Ala Ser Thr Asn Gln Thr Ser Met Tyr Leu Cys Ala Ser Ser Ser Ile
85 90 95

Asn Glu Gln Phe Phe Gly Pro Gly Thr Arg Leu Thr Val Leu Glu Asp
100 105 110

Leu Lys Asn
115

<210> 2
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<212> PRT
<213> Homo sapiens

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Ala Ile Ala Ser Leu Asn Cys Thr Tyr Ser Asp Arg Val Ser Gln Ser
            20                  25                  30

Phe Phe Trp Tyr Arg Gln Tyr Ser Gly Lys Ser Pro Glu Leu Ile Met
        35                  40                  45

Ser Ile Tyr Ser Asn Gly Asp Lys Glu Asp Gly Arg Phe Thr Ala Gln
    50                  55                  60

Leu Asn Lys Ala Ser Gln Tyr Val Ser Leu Leu Ile Arg Asp Ser Gln
65                  70                  75                  80

Pro Ser Asp Ser Ala Thr Tyr Leu Cys Ala Ala Asn Asn Ala Gly Asn
                85                  90                  95

Met Leu Thr Phe Gly Gly Gly Thr Arg Leu Met Val Lys Pro His Ile
            100                 105                 110
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<210> 3
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<213> Artificial Sequence

<220>
<223> Modified variable beta region of the TCR with high affinity to WT1/HLA-A2

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Asp Val Lys Val Thr Gln Ser Ser Arg Tyr Leu Val Lys Arg Thr Gly
1               5                   10                  15

Glu Lys Val Phe Leu Glu Cys Val Gln Asp Met Asp His Glu Asn Met
            20                  25                  30

Phe Trp Tyr Arg Gln Asp Pro Gly Leu Gly Leu Arg Leu Ile Tyr Ser
        35                  40                  45

Ser Tyr Gly Val Lys Met Lys Glu Lys Gly Asp Ile Pro Glu Gly Tyr
    50                  55                  60

Ser Val Ser Arg Glu Lys Lys Glu Arg Phe Ser Leu Ile Leu Glu Ser
65                  70                  75                  80

Ala Ser Thr Asn Gln Thr Ser Met Tyr Leu Cys Ala Thr Ser Asn Tyr
                85                  90                  95
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Leu Glu Gln Phe Phe Gly Pro Gly Thr Arg Leu Thr Val Leu Glu Asp
100 105 110

Leu Lys Asn
115

<210> 4
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Ala Ile Ala Ser Leu Asn Cys Thr Tyr Ser Asp Arg Asp Leu Gly Ser
20 25 30

Phe Phe Trp Tyr Arg Gln Tyr Ser Gly Lys Ser Pro Glu Leu Ile Met
35 40 45

Ser Ile Tyr Ser Asn Gly Asp Lys Glu Asp Gly Arg Phe Thr Ala Gln
50 55 60

Leu Asn Lys Ala Ser Gln Tyr Val Ser Leu Leu Ile Arg Asp Ser Gln
65 70 75 80

Pro Ser Asp Ser Ala Thr Tyr Leu Cys Ala Ala Asn Asn Ala Gly Asn
85 90 95

Met Leu Thr Phe Gly Gly Gly Thr Arg Leu Met Val Lys Pro His Ile
100 105 110

<210> 5
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<213> Artificial Sequence

<220>
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Asp Val Lys Val Thr Gln Ser Ser Arg Tyr Leu Val Lys Arg Thr Gly
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Glu Lys Val Phe Leu Glu Cys Val Gln Asp Met Asp His Glu Asn Met

20 25 30

Phe Trp Tyr Arg Gln Asp Pro Gly Leu Gly Leu Arg Leu Ile Tyr Ser
35 40 45

Ser Tyr Gly Val Lys Met Lys Glu Lys Gly Asp Ile Pro Glu Gly Tyr
50 55 60

Ser Val Ser Arg Glu Lys Lys Glu Arg Phe Ser Leu Ile Leu Glu Ser
65 70 75 80

Ala Ser Thr Asn Gln Thr Ser Met Tyr Leu Cys Ala Thr Ser Asn Tyr
85 90 95

Leu Glu Gln Phe Phe Gly Pro Gly Thr Arg Leu Thr Val Leu Glu Asp
100 105 110

Leu Lys Asn Gly Ser Ala Asp Asp Ala Lys Lys Asp Ala Ala Lys Lys
115 120 125

Asp Gly Lys Ser Gln Lys Glu Val Glu Gln Asn Ser Gly Pro Leu Ser
130 135 140

Val Pro Glu Gly Ala Ile Ala Ser Leu Asn Cys Thr Tyr Ser Asp Arg
145 150 155 160

Asp Leu Gly Ser Phe Phe Trp Tyr Arg Gln Tyr Ser Gly Lys Ser Pro
165 170 175

Glu Leu Ile Met Ser Ile Tyr Ser Asn Gly Asp Lys Glu Asp Gly Arg
180 185 190

Phe Thr Ala Gln Leu Asn Lys Ala Ser Gln Tyr Val Ser Leu Leu Ile
195 200 205

Arg Asp Ser Gln Pro Ser Asp Ser Ala Thr Tyr Leu Cys Ala Ala Asn
210 215 220

Asn Ala Gly Asn Met Leu Thr Phe Gly Gly Gly Thr Arg Leu Met Val
225 230 235 240

Lys Pro His Ile

<210> 6
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<213> Homo sapiens

<400> 6

Arg Met Phe Pro Asn Ala Pro Tyr Leu
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<210> 7
<211> 9
<212> PRT
<213> Human T cell lymphotrophic virus

<400> 7

Leu Leu Phe Gly Tyr Pro Val Tyr Val
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<210> 8
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<212> PRT
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Ser

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<210> 10
<211> 63
<212> DNA
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<223> Reverse primer used to generate the WT1-D13 CDR1alpha library

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gct 63

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cagtacagtg gcaaatcccc g 81

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<223> Primer T7

<400> 12
taatacgact cactataggg 20

<210> 13
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<212> DNA
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ttcttt 66

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ggcccaggta caagattaac ggtg 84

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ttcttt 66

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ggcccaggta caagattaac ggtg 84

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<223> Reverse primer used to generate the WT1-D13.1 CDR3 alpha1 library

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ttcggtggcg gtactcgctt aatg 84

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ctggga 66

<210> 20
<211> 84
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ttcggtggcg gtactcgctt aatg 84

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<400> 21

Asp Val Lys Val Thr Gln Ser Ser Arg Tyr Leu Val Lys Arg Thr Gly
1 5 10 15

Glu Lys Val Phe Leu Glu Cys Val Gln Asp Met Asp His Glu Asn Met
20 25 30

Phe Trp Tyr Arg Gln Asp Pro Gly Leu Gly Leu Arg Leu Ile Tyr Ser
35 40 45

Ser Tyr Gly Val Lys Met Lys Glu Lys Gly Asp Ile Pro Glu Gly Tyr
50 55 60

Ser Val Ser Arg Glu Lys Lys Glu Arg Phe Ser Leu Ile Leu Glu Ser
65 70 75 80

Ala Ser Thr Asn Gln Thr Ser Met Tyr Leu Cys Ala Ser Ser Ser Ile
85 90 95

Asn Glu Gln Phe Phe Gly Pro Gly Thr Arg Leu Thr Val Leu Glu Asp
100 105 110

Leu Lys Asn
115

<210> 22
<211> 112
<212> PRT
<213> Artificial Sequence

<220>
<223> Modified variable alpha region of the TCR with high affinity to WT1/HLA-A2

<400> 22

Gln Lys Glu Val Glu Gln Asn Ser Gly Pro Leu Ser Val Pro Glu Gly
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Ala Ile Ala Ser Leu Asn Cys Thr Tyr Ser Asp Arg Val Ser Gln Pro
            20                  25                  30

Phe Phe Trp Tyr Arg Gln Tyr Ser Gly Lys Ser Pro Glu Leu Ile Met
        35                  40                  45

Ser Ile Tyr Ser Asn Gly Asp Lys Glu Asp Gly Arg Phe Thr Ala Gln
    50                  55                  60

Leu Asn Lys Ala Ser Gln Tyr Val Ser Leu Leu Ile Arg Asp Ser Gln
65                  70                  75                  80

Pro Ser Asp Ser Ala Thr Tyr Leu Cys Ala Ala Asn Asn Ala Gly Asn
                85                  90                  95

Met Leu Thr Phe Gly Gly Gly Thr Arg Leu Met Val Lys Pro His Ile
            100                 105                 110
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<400> 23

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<210> 24
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<212> PRT
<213> Influenza A

<400> 24

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<210> 25
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<213> Artificial Sequence

<220>
<223> WT1 structurally similar human peptide

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<210> 26
<211> 9
<212> PRT

<213> Artificial Sequence

<220>
<223> WT1 structurally similar human peptide

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<210> 27
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<223> WT1 structurally similar human peptide

<400> 27

His Met Trp Gly Gln Ser Leu Tyr Ile
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<210> 28
<211> 9
<212> PRT
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<220>
<223> WT1 structurally similar human peptide

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<210> 29
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<223> WT1 structurally similar human peptide

<400> 29

Lys Ile Phe Pro Ser Cys Leu Phe Val
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<210> 30
<211> 9
<212> PRT
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Lys Leu Trp Pro Ser Val Ala Phe Ala

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<210> 31
<211> 9
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<213> Artificial Sequence

<220>
<223> WT1 structurally similar human peptide

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His Leu Trp Gly Gln Ser Leu Tyr Ile
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Arg Ile Trp Leu Ser Val Val Phe Val
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<210> 33
<211> 9
<212> PRT
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<220>
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<400> 33

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<212> PRT
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<220>
<223> WT1 structurally similar human peptide

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Arg Ile Phe Ser Thr Ala Leu Phe Val
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