

Table S3. Functional centers of 22 types microenvironments

| Non-polar |                 | Polar            |            | Positive-charged |                         |
|-----------|-----------------|------------------|------------|------------------|-------------------------|
| G         | Hypothetical CB | S                | OG         | H                | NE2 ND                  |
| C         | SG              | T                | OG1        | K                | NZ                      |
| A         | CB              | Q                | OE1 CD NE2 | R                | CZ                      |
| I         | CB              | N                | OD1 CG ND2 |                  |                         |
| L         | CB              | W1               | NE1        | Aromatic         |                         |
| V         | CB              | Y1               | OH         | W2               | CD2 CE2 CE3 CZ2 CZ3 CH2 |
| P         | N CA CB CD CG   | Negative charged |            | Y2               | CG CD1 CD2 CE1 CE2 CZ   |
| M         | SD              | D                | OD1 CG OD2 | F                | CG CD1 CD2 CE1 CE2 CZ   |
|           |                 | E                | OE1 CD OE2 |                  |                         |