

**Table S1.** List of designed proteins from previous experiments.

<b>Sequence ID</b>	<b>PDB ID</b>	<b>Length</b>	<b>Failed step<sup>a</sup></b>	<b>References</b>
1lq7A	1lq7A	67	Success	Dai et al [1]
1mj0A	1mj0A	156	Success	Kohl et al [2]
1p68A	1p68A	102	Success	Wei et al [3]
1qysA	1qysA	91	Success	Kuhlman et al [4]
1vjqa	1vjqa	71	Success	Dantas et al [5]
2a3dA	2a3dA	73	Success	Walsh et al [6]
2cw1A	2cw1A	65	Success	Walsh et al [6]
2juaA	2juaA	102	Success	Go et al [7]
2jvfA	2jvfA	94	Success	Stordeur et al [8]
2kl8A	2kl8A	85	Success	Koga et al [9]
2ln3A	2ln3A	83	Success	Koga et al [9]
2ltaA	2ltaA	110	Success	Koga et al [9]
2lv8A	2lv8A	110	Success	Koga et al [9]
2lvbA	2lvbA	112	Success	Koga et al [9]
2qyjA	2qyjA	154	Success	Merz et al [10]
3b83A	3b83A	95	Success	Hu et al [11]
MSP2-FC27	/	237	Natively unfolded	Zhang et al [12]
alpha-synuclein	/	140	Natively unfolded	Eliezer et al [13]
4EbindingproteinI	/	118	Natively unfolded	Fletcher et al [14]
4EbindingproteinII	/	120	Natively unfolded	Fletcher et al [14]
Fold-I-11	/	76	Not soluble	Koga et al [9]
Fold-I-2	/	76	Not folded-CD	Koga et al [9]
Fold-I-4	/	76	Not folded-CD	Koga et al [9]
Fold-I-8	/	76	Not folded NMR	Koga et al [9]
Fold-II-8	/	99	Not folded-CD	Koga et al [9]
Fold-II-9	/	99	Not folded-CD	Koga et al [9]
Fold-II-1	/	99	Not folded NMR	Koga et al [9]
Fold-II-3	/	99	Not folded NMR	Koga et al [9]
Fold-II-11	/	99	Not folded NMR	Koga et al [9]
Fold-III-6	/	72	Not soluble	Koga et al [9]
Fold-III-7	/	72	Not soluble	Koga et al [9]
Fold-III-1	/	72	Incorrect CD	Koga et al [9]
Fold-III-13	/	72	Not folded-CD	Koga et al [9]
Fold-III-4	/	72	Not folded NMR	Koga et al [9]
Fold-IV-2	/	101	Not folded NMR	Koga et al [9]
Fold-V-8	/	99	Not soluble	Koga et al [9]
Fold-V-1	/	99	Not folded-CD	Koga et al [9]
Fold-V-2	/	99	Not folded-CD	Koga et al [9]
Fold-V-4	/	99	Not folded-CD	Koga et al [9]
Fold-V-9	/	99	Not folded-CD	Koga et al [9]
Fold-V-10	/	99	Not folded-CD	Koga et al [9]
Fold-V-11	/	99	Not folded-CD	Koga et al [9]

Fold-V-12	/	99	Not folded-CD	Koga et al [9]
MDM2a	/	85	Not folded-CD	Shultis et al [15]
MDM2b	/	85	Not folded-CD	Shultis et al [15]

<sup>a</sup>**Success:** protein structure was solvable by NMR or X-ray crystallography; **Natively unfolded:** biologically expressed (i.e. not designed) protein experimentally known to be unfolded in the native state; **Not soluble:** protein was not soluble after expression (usually indicative of improperly exposed hydrophobic surfaces); **Not folded-CD:** largely random coil secondary structure by CD; **Incorrect CD:** secondary structure by CD not consistent with predicted structure; **Not folded NMR:** poorly resolved NMR spectra reflective of a dynamic (unstable) protein core.

## References

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