Electronic Supplementary Material (ESI) for Physical Chemistry Chemical Physics.

Supporting Information for the paper entitled:

Singlet fission relevant energetics from optimally tuned range-separated hybrids

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Table S1. The computed values of the singlet excitation energies (eV) for the experimentally known SF chromophores under study.

Chromophore	$\alpha = 0.0, \beta = 1.0$			$\alpha = 0.05, \beta = 0.95$		
	BLYP	PBE	TPSS	BLYP	PBE	TPSS
I	2.61	2.62	2.63	2.60	2.61	2.62
II	3.13	3.15	3.16	3.16	3.17	3.18
III	2.59	2.59	2.61	2.60	2.61	2.62
IV	2.57	2.57	2.59	2.56	2.56	2.58
V	2.11	2.11	2.13	2.12	2.12	2.14
VI	2.15	2.16	2.17	2.17	2.17	2.19
VII	2.12	2.12	2.14	2.14	2.14	2.15
VIII	2.08	2.08	2.10	2.10	2.10	2.12

Chromophore	$\alpha = 0.10, \beta = 0.90$			$\alpha = 0.15, \beta = 0.85$		
	BLYP	PBE	TPSS	BLYP	PBE	TPSS
I	2.62	2.63	2.64	2.60	2.60	2.61
II	3.14	3.16	3.17	3.16	3.17	3.18
III	2.64	2.64	2.66	2.63	2.63	2.65
IV	2.58	2.58	2.60	2.59	2.60	2.61
V	2.13	2.14	2.15	2.14	2.15	2.16
VI	2.18	2.18	2.20	2.19	2.20	2.21
VII	2.15	2.15	2.17	2.17	2.17	2.18
VIII	2.12	2.12	2.14	2.14	2.14	2.15

Chromophore	$\alpha = 0.20, \beta = 0.80$		
	BLYP	PBE	TPSS
I	2.60	2.60	2.61
II	3.14	3.15	3.16
III	2.64	2.65	2.66
IV	2.61	2.62	2.63
V	2.15	2.16	2.17
VI	2.21	2.21	2.22
VII	2.18	2.18	2.20
VII	2.15	2.15	2.17

Table S2. The computed values of the first triplet excitation energies (eV) for the experimentally known SF chromophores under study.

Chromophore	$\alpha = 0.0, \beta = 1.0$			$\alpha = 0.05, \beta = 0.95$		
	BLYP	PBE	TPSS	BLYP	PBE	TPSS
I	1.13	1.11	1.09	1.11	1.10	1.08
II	1.58	1.56	1.54	1.57	1.55	1.53
III	1.28	1.26	1.25	1.27	1.25	1.24
IV	1.34	1.32	1.30	1.33	1.31	1.29
V	0.85	0.83	0.81	0.84	0.82	0.80
VI	0.87	0.86	0.84	0.86	0.85	0.83
VII	0.86	0.85	0.83	0.86	0.84	0.82
VIII	0.85	0.84	0.82	0.85	0.83	0.82

Chromophore	$\alpha = 0.10, \beta = 0.90$			$\alpha = 0.15, \beta = 0.85$		
	BLYP	PBE	TPSS	BLYP	PBE	TPSS
I	1.10	1.08	1.06	1.09	1.07	1.05
II	1.56	1.54	1.52	1.55	1.53	1.51
III	1.27	1.25	1.24	1.26	1.24	1.23
IV	1.32	1.30	1.29	1.32	1.30	1.28
V	0.83	0.81	0.79	0.82	0.80	0.78
VI	0.86	0.84	0.82	0.85	0.83	0.82
VII	0.85	0.83	0.81	0.84	0.82	0.81
VIII	0.84	0.82	0.81	0.83	0.81	0.80

Chromophore	$\alpha = 0.20, \beta = 0.80$		
	BLYP	PBE	TPSS
I	1.07	1.05	1.03
II	1.53	1.51	1.50
III	1.25	1.23	1.22
IV	1.31	1.29	1.27
V	0.81	0.79	0.77
VI	0.84	0.82	0.81
VII	0.83	0.81	0.80
VIII	0.82	0.80	0.79

Table S3. The computed values of the second triplet excitation energies (eV) for the experimentally known SF chromophores under study.

Chromophore	$\alpha = 0.0, \beta = 1.0$			$\alpha = 0.05, \beta = 0.95$		
	BLYP	PBE	TPSS	BLYP	PBE	TPSS
I	2.21	2.20	2.18	2.20	2.19	2.17
II	2.82	2.80	2.79	2.81	2.80	2.78
III	2.48	2.47	2.46	2.48	2.47	2.46
IV	2.57	2.56	2.55	2.57	2.55	2.55
V	2.12	2.11	2.10	2.12	2.11	2.10
VI	2.22	2.21	2.20	2.22	2.21	2.20
VII	2.12	2.11	2.11	2.13	2.12	2.11
VIII	2.10	2.09	2.09	2.11	2.10	2.10

Chromophore	$\alpha = 0.10, \beta = 0.90$			$\alpha = 0.15, \beta = 0.85$		
	BLYP	PBE	TPSS	BLYP	PBE	TPSS
I	2.20	2.18	2.17	2.19	2.17	2.16
II	2.80	2.79	2.77	2.80	2.78	2.77
III	2.49	2.48	2.47	2.48	2.47	2.47
IV	2.57	2.55	2.55	2.57	2.55	2.55
V	2.12	2.10	2.10	2.12	2.10	2.10
VI	2.22	2.21	2.20	2.22	2.21	2.20
VII	2.14	2.12	2.12	2.14	2.13	2.12
VIII	2.12	2.11	2.11	2.13	2.11	2.11

Chromophore	$\alpha = 0.20, \beta = 0.80$		
	BLYP	PBE	TPSS
I	2.18	2.16	2.15
II	2.79	2.77	2.76
III	2.49	2.47	2.47
IV	2.57	2.55	2.55
V	2.11	2.10	2.09
VI	2.22	2.21	2.20
VII	2.15	2.13	2.13
VIII	2.13	2.12	2.12

Table S4. The computed values of the SF energy gap (eV) for the experimentally known SF chromophores under study. Also given in the table are the experimental data used as reference.

Chromophore		$\alpha = 0.0, \beta = 1.0$			$\alpha = 0.05, \beta = 0.95$		
	Ref.	BLYP	PBE	TPSS	BLYP	PBE	TPSS
I	-0.40	-0.36	-0.40	-0.46	-0.38	-0.42	-0.47
II	-0.07	0.02	-0.03	-0.08	-0.02	-0.07	-0.11
III	-0.17	-0.04	-0.07	-0.12	-0.06	-0.10	-0.14
IV	-0.07	0.11	0.07	0.02	0.09	0.05	0.01
V	-0.34	-0.42	-0.45	-0.50	-0.45	-0.48	-0.53
VI	-0.31	-0.41	-0.44	-0.49	-0.44	-0.47	-0.52
VII	-0.32	-0.40	-0.43	-0.48	-0.43	-0.46	-0.51
VIII	-0.34	-0.37	-0.40	-0.46	-0.41	-0.44	-0.49

Chromophore	$\alpha = 0.10, \beta = 0.90$			$\alpha = 0.15, \beta = 0.85$		
	BLYP	PBE	TPSS	BLYP	PBE	TPSS
I	-0.41	-0.46	-0.51	-0.42	-0.47	-0.52
II	-0.03	-0.08	-0.13	-0.06	-0.11	-0.16
III	-0.10	-0.14	-0.18	-0.11	-0.15	-0.19
IV	0.07	0.02	-0.02	0.04	-0.01	-0.05
V	-0.48	-0.51	-0.56	-0.51	-0.55	-0.59
VI	-0.47	-0.50	-0.55	-0.50	-0.54	-0.58
VII	-0.46	-0.49	-0.54	-0.49	-0.53	-0.57
VIII	-0.44	-0.47	-0.52	-0.47	-0.51	-0.55

Chromophore	$\alpha = 0.20, \beta = 0.80$		
	BLYP	PBE	TPSS
I	-0.45	-0.50	-0.54
II	-0.07	-0.13	-0.17
III	-0.14	-0.18	-0.22
IV	0.01	-0.04	-0.08
V	-0.54	-0.58	-0.62
VI	-0.53	-0.57	-0.61
VII	-0.53	-0.56	-0.61

VIII	-0.51	-0.54	-0.59

Table S5. The computed values of the TT energy gap (eV) for the experimentally known SF chromophores under study.

Chromophore	$\alpha = 0.0, \beta = 1.0$			$\alpha = 0.05, \beta = 0.95$		
	BLYP	PBE	TPSS	BLYP	PBE	TPSS
I	0.05	0.03	0.00	0.03	0.00	-0.02
II	0.34	0.32	0.30	0.33	0.31	0.28
III	0.07	0.05	0.03	0.06	0.04	0.02
IV	0.10	0.08	0.06	0.09	0.06	0.04
V	-0.43	-0.44	-0.47	-0.44	-0.46	-0.49
VI	-0.47	-0.49	-0.52	-0.49	-0.51	-0.54
VII	-0.39	-0.41	-0.45	-0.42	-0.44	-0.47
VIII	-0.39	-0.41	-0.45	-0.42	-0.44	-0.47

Chromophore	$\alpha = 0.10, \beta = 0.90$			$\alpha = 0.15, \beta = 0.85$		
	BLYP	PBE	TPSS	BLYP	PBE	TPSS
I	0.01	-0.01	-0.04	-0.01	-0.04	-0.06
II	0.31	0.29	0.27	0.30	0.30	0.25
III	0.05	0.03	0.00	0.03	0.01	-0.01
IV	0.07	0.05	0.03	0.06	0.04	0.02
V	-0.46	-0.48	-0.51	-0.48	-0.50	-0.53
VI	-0.51	-0.53	-0.55	-0.53	-0.55	-0.57
VII	-0.44	-0.46	-0.49	-0.47	-0.49	-0.51

VIII	-0.44	-0.46	-0.49	-0.46	-0.49	-0.51

Chromophore	$\alpha = 0.20, \beta = 0.80$		
	BLYP	PBE	TPSS
I	-0.03	-0.06	-0.08
II	0.28	0.26	0.24
III	0.02	0.00	-0.02
IV	0.05	0.02	0.00
V	-0.50	-0.52	-0.54
VI	-0.54	-0.57	-0.59
VII	-0.49	-0.51	-0.54
VIII	-0.49	-0.51	-0.54

Table S6. The computed values of the singlet and first triplet excitation energies (eV) using the best proposed OT-RSH based on TPSS DFA, TPSS ($\alpha = 0.10, \beta = 0.90$), and its standard version, LC-TPSS, for the experimentally known SF chromophores under study. Also given in the table are the experimental data used as reference.

	Singlet excitation energies			Triplet excitation energies [j]		
Chromophore	Ref.	TPSS ($\alpha = 0.10, \beta = 0.90$)	LC-TPSS	Ref.	TPSS ($\alpha = 0.10, \beta = 0.90$)	LC-TPSS
I [a, b]	2.30	2.64	2.95	0.95	1.06 (0.83)	1.05
II [c-e]	2.63	3.17	3.50	1.28	1.52 (1.26)	1.52
III [f]	2.25	2.66	3.07	1.04	1.24 (1.01)	1.25
IV [g, h]	2.35	2.60	3.09	1.14	1.29 (1.03)	1.33
V [i]	1.90	2.15	2.54	0.78	0.79 (0.57)	0.77
VI [i]	1.91	2.20	2.59	0.80	0.82 (0.58)	0.80
VII [i]	1.92	2.17	2.57	0.80	0.81 (0.59)	0.79
VIII [i]	1.88	2.14	2.57	0.77	0.81 (0.57)	0.80

[a] E. Heinecke, D. Hartmann, R. Muller and A. Hese, *J. Chem. Phys*., 1998, **109**, 906-911.

[b] N. Nijegorodov, V. Ramachandran and D. P. Winkoun, *Spectrochim. Acta, Part A*, 1997, **53**, 1813-1824.

[c] Y. Tomkiewicz, R. P. Groff and P. Avakian, *J. Chem. Phys*., 1971, **54**, 4504-4507.

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[e] N. Sabbatini, M. T. Indelli, M. T. Gandolfi and V. Balzani, *J. Phys. Chem*., 1982, **86**, 3585-3591.

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[h] W. G. Herkstroeter and P. B. Merkel, *J. Photochem*., 1981, **16**, 331- 341.

[i] Y.-D. Zhang, Y. Wu, Y. Xu, Q. Wang, K. Liu, J.-W. Chen, J.-J. Cao, C. Zhang, H. Fu and H.-L. Zhang, *J. Am. Chem. Soc*., 2016, **138**, 6739-6745.

[j] The adiabatic triplet excitation energies are given in the parentheses.

Table S7. The computed values of the singlet and first triplet excitation energies (eV) using the best proposed OT-RSH based on PBE DFA, PBE ($\alpha = 0.15, \beta = 0.85$), and its standard version, LC-PBE, for the experimentally known SF chromophores under study. Also given in the table are the experimental data used as reference.

	Singlet excitation energies			Triplet excitation energies [j]		
Chromophore	Ref.	PBE ($\alpha = 0.15, \beta = 0.85$)	LC-PBE	Ref.	PBE ($\alpha = 0.15, \beta = 0.85$)	LC-PBE
I [a, b]	2.30	2.60	2.95	0.95	1.07 (0.85)	1.06
II [c-e]	2.63	3.17	3.50	1.28	1.53 (1.28)	1.54
III [f]	2.25	2.63	3.07	1.04	1.24 (1.00)	1.27
IV [g, h]	2.35	2.60	3.09	1.14	1.30 (1.06)	1.34
V [i]	1.90	2.15	2.54	0.78	0.80 (0.61)	0.78
VI [i]	1.91	2.20	2.59	0.80	0.83 (0.60)	0.82
VII [i]	1.92	2.17	2.57	0.80	0.82 (0.61)	0.81
VIII [i]	1.88	2.14	2.57	0.77	0.81 (0.59)	0.81

[a] E. Heinecke, D. Hartmann, R. Muller and A. Hese, *J. Chem. Phys*., 1998, **109**, 906-911.

[b] N. Nijegorodov, V. Ramachandran and D. P. Winkoun, *Spectrochim. Acta, Part A*, 1997, **53**, 1813-1824.

[c] Y. Tomkiewicz, R. P. Groff and P. Avakian, *J. Chem. Phys*., 1971, **54**, 4504-4507.

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[h] W. G. Herkstroeter and P. B. Merkel, *J. Photochem*., 1981, **16**, 331- 341.

[i] Y.-D. Zhang, Y. Wu, Y. Xu, Q. Wang, K. Liu, J.-W. Chen, J.-J. Cao, C. Zhang, H. Fu and H.-L. Zhang, *J. Am. Chem. Soc*., 2016, **138**, 6739-6745.

[j] The adiabatic triplet excitation energies are given in the parentheses.

Table S8. Statistical metrics (eV) on the performance of the best OT-RSHs in this work in the calculations of the singlet and triplet excitation energies for the experimentally known SF chromophores under study. Also given in the table are the corresponding data for the standard counterparts.

RSHs	MSD	MAD	MaxAD	MinAD	RMSD
	Singlet excitation energy				
OT-RSHs					
TPSS ($\alpha = 0.10, \beta = 0.90$)	0.32	0.32	0.54	0.25	0.34
PBE ($\alpha = 0.15, \beta = 0.85$)	0.31	0.31	0.54	0.25	0.33
Standard RSHs					
LC-TPSS	0.72	0.72	0.87	0.64	0.72
LC-PBE	0.72	0.72	0.87	0.64	0.72
	Triplet excitation energy [a]				
OT-RSHs					
TPSS ($\alpha = 0.10, \beta = 0.90$)	0.10 (-0.14)	0.10 (0.14)	0.24 (0.22)	0.01 (0.02)	0.13 (0.16)
PBE ($\alpha = 0.15, \beta = 0.85$)	0.10 (-0.12)	0.10 (0.12)	0.25 (0.20)	0.02 (0.00)	0.13 (0.14)

Standard RSHs					
LC-TPSS	0.10	0.10	0.24	0.00	0.14
LC-PBE	0.11	0.11	0.26	0.00	0.15

[a] The metrics on the adiabatic triplet excitation energies are given in the parentheses.

Table S9. The computed values of the singlet excitation energies (eV) based on the considered solvation models for the experimentally known SF chromophores under study.

Chromophore	OT-RSHs-PCM		OT-SRSHs [a]	
	TPSS ($\alpha = 0.10, \beta = 0.90$)	PBE ($\alpha = 0.15, \beta = 0.85$)	TPSS ($\alpha = 0.10, \beta = 0.32$)	PBE ($\alpha = 0.15, \beta = 0.27$)
I	2.56	2.53	2.52	2.24
II	3.11	3.11	2.79	2.79
III	2.58	2.55	2.37	2.37
IV	2.54	2.54	2.37	2.38
V	2.05	2.05	1.90	1.91
VI	2.11	2.11	1.96	1.97
VII	2.08	2.08	1.92	1.93
VIII	2.05	2.05	1.86	1.87

[a] In toluene solvent with the dielectric constant of about 2.37.

Table S10. The computed values of the first triplet excitation energies (eV) based on the considered solvation models for the experimentally known SF chromophores under study.

Chromophore	OT-RSHs-PCM		OT-SRSHs [a]	
	TPSS ($\alpha = 0.10, \beta = 0.90$)	PBE ($\alpha = 0.15, \beta = 0.85$)	TPSS ($\alpha = 0.10, \beta = 0.32$)	PBE ($\alpha = 0.15, \beta = 0.27$)
I	1.06	1.07	0.99	1.00
II	1.52	1.53	1.45	1.45
III	1.24	1.25	1.20	1.20
IV	1.29	1.30	1.24	1.25
V	0.79	0.80	0.77	0.78
VI	0.83	0.84	0.80	0.81
VII	0.82	0.82	0.79	0.80
VIII	0.81	0.82	0.77	0.78

[a] In toluene solvent with the dielectric constant of about 2.37.

Table S11. The computed values of the second triplet excitation energies (eV) based on the considered solvation models for the experimentally known SF chromophores under study.

Chromophore	OT-RSHs-PCM		OT-SRSHs [a]	
	TPSS ($\alpha = 0.10, \beta = 0.90$)	PBE ($\alpha = 0.15, \beta = 0.85$)	TPSS ($\alpha = 0.10, \beta = 0.32$)	PBE ($\alpha = 0.15, \beta = 0.27$)
I	2.17	2.17	2.11	2.12
II	2.78	2.79	2.72	2.72
III	2.47	2.47	2.41	2.42
IV	2.55	2.56	2.50	2.51
V	2.10	2.10	2.03	2.04
VI	2.21	2.22	2.16	2.17
VII	2.12	2.13	2.06	2.07
VIII	2.11	2.12	2.03	2.04

[a] In toluene solvent with the dielectric constant of about 2.37.

Table S12. The computed values of the SF energy gap (eV) based on the considered solvation models for the experimentally known SF chromophores under study.

Chromophore	OT-RSHs-PCM		OT-SRSHs [a]	
	TPSS ($\alpha = 0.10, \beta = 0.90$)	PBE ($\alpha = 0.15, \beta = 0.85$)	TPSS ($\alpha = 0.10, \beta = 0.32$)	PBE ($\alpha = 0.15, \beta = 0.27$)
I	-0.43	-0.39	-0.27	-0.24
II	-0.06	-0.05	0.10	0.12
III	-0.09	-0.06	0.02	0.04
IV	0.04	0.05	0.11	0.12
V	-0.47	-0.45	-0.37	-0.36
VI	-0.45	-0.44	-0.36	-0.34
VII	-0.45	-0.43	-0.35	-0.33
VIII	-0.43	-0.42	-0.31	-0.30

[a] In toluene solvent with the dielectric constant of about 2.37.

Table S13. The computed values of the TT energy gap (eV) based on the considered solvation models for the experimentally known SF chromophores under study.

Chromophore	OT-RSHs-PCM		OT-SRSHs [a]	
	TPSS ($\alpha = 0.10, \beta = 0.90$)	PBE ($\alpha = 0.15, \beta = 0.85$)	TPSS ($\alpha = 0.10, \beta = 0.32$)	PBE ($\alpha = 0.15, \beta = 0.27$)
I	-0.04	-0.04	-0.13	-0.12
II	0.27	0.27	0.17	0.18
III	0.02	0.03	-0.02	-0.01
IV	0.03	0.03	-0.02	0.00
V	-0.51	-0.50	-0.50	-0.49
VI	-0.55	-0.55	-0.55	-0.55
VII	-0.49	-0.48	-0.48	-0.47
VIII	-0.49	-0.48	-0.48	-0.48

[a] In toluene solvent with the dielectric constant of about 2.37.

Table S14. The computed values of the singlet and first triplet excitation energies as well as the SF energy gaps (eV) based on the considered solvation models for some of the experimentally known SF chromophores at the optimized geometries in the solvent. [a]

Chromophore	OT-RSHs-PCM		OT-SRSHs	
	TPSS ($\alpha = 0.10,\beta = 0.90$)	PBE ($\alpha = 0.15,\beta = 0.85$)	TPSS ($\alpha = 0.10,\beta = 0.32$)	PBE ($\alpha = 0.15,\beta = 0.27$)
	Singlet excitation energy		Singlet excitation energy	
II [b]			2.79	2.78
III [c]			2.35	2.35
IV [d]	2.52	2.52	2.36	2.37
	First triplet excitation energy		First triplet excitation energy	
II [b]			1.45	1.45
III [c]			1.19	1.19
IV [d]	1.28	1.29	1.24	1.25
	SF energy gap		SF energy gap	
II [b]			0.10	0.12
III [c]			0.02	0.04
IV [d]	0.04	0.06	0.11	0.13

[a] In toluene solvent with the dielectric constant of about 2.37.

[b] The values of the range-separation parameter were found to be 0.2034 and 0.1912 Bohr^{-1} for the combinations of $\alpha = 0.10,\beta = 0.90$ and $\alpha = 0.15,\beta = 0.85$, respectively.

[c] The values of the range-separation parameter were found to be 0.1569 and 0.1495 Bohr^{-1} for the combinations of $\alpha = 0.10,\beta = 0.90$ and $\alpha = 0.15,\beta = 0.85$, respectively.

[d] The values of the range-separation parameter were found to be 0.1413 and 0.1342 $Bohr^{-1}$ for the combinations of $\alpha = 0.10, \beta = 0.90$ and $\alpha = 0.15, \beta = 0.85$, respectively.

Table S15. The computed values of the singlet excitation energies (eV) using the best proposed OT-RSHs in this work for the theoretically designed chromophores.

Chromophore	TPSS ($\alpha = 0.10, \beta = 0.90$)	PBE ($\alpha = 0.15, \beta = 0.85$)
IX	2.12	2.12
X	2.04	2.04
XI	1.56	1.56
XII	2.55	2.54
XIII	2.78	2.76
XIV	2.52	2.52
XV	2.60	2.60
XVI	2.39	2.39
XVII	2.11	2.11
XVIII	2.10	2.10
XIX	2.14	2.14

Table S16. The computed values of the first triplet excitation energies (eV) using the best proposed OT-RSHs in this work for the theoretically designed chromophores.

Chromophore	TPSS ($\alpha = 0.10, \beta = 0.90$)	PBE ($\alpha = 0.15, \beta = 0.85$)
IX	0.81	0.81
X	0.78	0.78
XI	0.05	0.06
XII	1.05	1.06
XIII	1.49	1.50
XIV	1.26	1.26
XV	1.23	1.24
XVI	1.12	1.13
XVII	0.79	0.79
XVIII	0.78	0.79
XIX	0.81	0.82

Table S17. The computed values of the second triplet excitation energies (eV) using the best proposed OT-RSHs in this work for the theoretically designed chromophores.

Chromophore	TPSS ($\alpha = 0.10, \beta = 0.90$)	PBE ($\alpha = 0.15, \beta = 0.85$)
IX	2.09	2.09
X	2.04	2.05
XI	1.21	1.22
XII	2.10	2.11
XIII	2.49	2.45
XIV	2.48	2.48
XV	2.46	2.47
XVI	2.36	2.37
XVII	2.06	2.07
XVIII	2.04	2.05
XIX	2.17	2.18

Table S18. The computed values of the SF and TT energy gaps (eV) using the best proposed OT-RSHs in this work for the theoretically designed chromophores.

Chromophore	SF energy gap		TT energy gap	
	TPSS ($\alpha = 0.10, \beta = 0.90$)	PBE ($\alpha = 0.15, \beta = 0.85$)	TPSS ($\alpha = 0.10, \beta = 0.90$)	PBE ($\alpha = 0.15, \beta = 0.85$)
IX	-0.51	-0.50	-0.48	-0.47
X	-0.49	-0.48	-0.49	-0.48
XI	-1.46	-1.43	-1.10	-1.09
XII	-0.45	-0.43	0.00	0.00
XIII	0.19	0.24	0.49	0.54
XIV	0.00	0.01	0.04	0.05
XV	-0.13	-0.12	0.01	0.02
XVI	-0.15	-0.13	-0.12	-0.11
XVII	-0.54	-0.52	-0.49	-0.49
XVIII	-0.54	-0.53	-0.48	-0.47
XIX	-0.52	-0.50	-0.54	-0.54