[0119]

[Table 1]

Items			Average particle diameter (mm)	pH	Example 1	Example 2	Example 3	Example 4	Example 5	Example 6	Example 7	Example 8	Example 9
Polyimide composition (mole ratio)	Tetracarboxylic acid dianhydride	ODPA			95	95	95	95	95	95	95	95	95
	Diamine represented by formula (1)	D400			-	30	-	-	-	-	-	-	-
		Elastomer 1000			60	60	60	60	60	60	60	60	60
	Diamine represented by formula (2)	SiDA			30	-	30	30	30	30	30	30	30
	Other diamines	MBAA			-	-	10	-	-	-	10	10	10
		BAHF			10	10	-	10	10	10	-	-	-
Polyimide Imidization ratio (%)					99	98	99	99	99	99	99	99	99
Polyimide weight-average molecular weight					29000	26800	30500	29000	29000	29000	30500	30500	30500
Adhesive resin composition (parts by weight)	(A) polyimide				6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25
	Epoxy resin	EPICLON850S			12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5
		EXA-4850-150			6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25
		NC3000			-	-	-	-	-	-	-	-	-
		PG100			-	-	-	-	-	-	-	-	-
	Hardening accelerator	2PZ			0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
	Thermally conductive filler	DAW-45	45	5.7	-	-	-	180	-	-	-	-	-
		AO820	20	5.2	180	180	180	-	-	-	-	-	-
		AO509	9	5.4	-	-	-	-	180	-	180	180	180
		AO502	0.7	5.5	-	-	-	-	-	180	-	-	-
		FAN-50	50	10.5	-	-	-	-	-	-	-	-	-
		FAN-30	30	10.5	-	-	-	-	-	-	-	33	66
		FAN-05	5	10.2	-	-	-	-	-	-	-	-	-
		HP-40	8	6.8	-	-	-	-	-	-	-	-	-
		MBN-010T	0.9	7.5	25	25	25	25	25	25	25	25	25
	Amount of thermally conductive filler with an average particle diameter of 6 mm or more added (vol.%)				58	58	58	58	58	0	58	63	67
	Amount of thermally conductive filler with an average particle diameter of 6 to 15 mm added (vol.%)				0	0	0	0	58	0	58	51	46
	Amount of thermally conductive filler with an average particle diameter of 30 mm or more added (vol.%)				0	0	0	58	0	0	0	12	21
	Amount of thermally conductive filler added (vol.%)				73	73	73	73	73	73	73	76	79

[0120]

[Table 2]

Items			Average particle diameter (mm)	ph	Example 10	Example 11	Example 12	Example 13	Example 14	Example 15	Example 16	Example 17	Example 18	Example 19	Example 20
Polyimide composition (mole ratio)	Tetracarboxylic acid dianhydride	ODPA			85	85	85	85	85	85	95	85	85	85	85
	Diamine represented by formula (1)	D400			—	—	—	—	—	—	—	—	—	—	—
		Elastomer 1000			60	60	60	60	60	60	60	60	60	60	60
	Diamine represented by formula (2)	SiDA			30	30	30	30	30	30	30	30	30	30	30
	Other diamines	MBAA			10	10	10	10	10	10	—	—	10	10	10
		BAHF			—	—	—	—	—	—	10	10	—	—	—
Polyimide Imidization ratio (%)					99	99	99	99	99	99	99	99	99	99	99
Polyimide weight-average molecular weight					12000	12000	12000	12000	12000	12000	29000	13000	12000	12000	12000
Adhesive resin composition (parts by weight)	(A) polyimide				6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25	12.5	16.5	6.25
	Epoxy resin	EPICLON850S			12.5	12.5	6.25	6.25	6.25	6.25	6.25	6.25	—	—	6.25
		EXA-4850-150			6.25	—		—	—	—	—	—	—	—	—
		NC3000			—	6.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25	6.25	9.25
		PG100			—	—	3.25	3.25	3.25	3.25	3.25	3.25	3.25	2.25	3.25
	Hardening accelerator	2PZ			0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
	Thermally conductive filler	DAW-45	45	5.7	—	—	—	—	—	—	—	—	—	—	—
		AO820	20	5.2	—	—	—	—	—	—	—	—	—	—	—
		AO509	9	5.4	180	180	180	180	180	180	180	180	180	180	260
		AO502	0.7	5.5	—	—	—	—	—	—	—	—	—	—	—
		FAN-50	50	10.5	—	—	—	—	66	99	66	66	66	66	—
		FAN-30	30	10.5	66	66	66	99	—	—	—	—	—	—	—
		FAN-05	5	10.2	—	—	—	—	—	—	—	—	—	—	—
		HP-40	8	6.8	—	—	—	—	—	—	—	—	—	—	—
		MBN-010T	0.9	7.5	25	25	25	25	25	25	25	25	25	25	25
	Amount of thermally conductive filler with an average particle diameter of 6 mm or more added (vol.%)				67	67	67	70	67	70	67	67	67	67	67
	Amount of thermally conductive filler with an average particle diameter of 6 to 15 mm added (vol.%)				46	46	46	42	46	42	46	46	46	46	67
	Amount of thermally conductive filler with an average particle diameter of 30 mm or more added (vol.%)				21	21	21	28	21	28	21	21	21	21	0
	Amount of thermally conductive filler added (vol.%)				79	79	79	81	79	81	79	79	79	79	79

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[0121]

[Table 3]

Items			Average particle diameter (mm)	ph	Example 21	Example 22	Example 23	Example 24	Example 25	Example 26
Polyimide composition (mole ratio)	Tetracarboxylic acid dianhydride	ODPA			95	95	95	95	95	95
	Diamine represented by formula (1)	D400			—	—	—	—	—	30
		Elastomer 1000			60	60	60	60	10	60
	Diamine represented by formula (2)	SiDA			30	30	30	30	80	—
	Other diamines	MBAA			—	—	—	—	—	—
		BAHF			10	10	10	10	10	10
Polyimide Imidization ratio (%)					99	99	99	99	98	98
Polyimide weight-average molecular weight					29000	29000	29000	29000	31400	26800
Adhesive resin composition (parts by weight)	(A) polyimide				6.25	6.25	6.25	6.25	6.25	6.25
	Epoxy resin	EPICLON850S			12.5	12.5	12.5	12.5	12.5	12.5
		EXA-4850-150			6.25	6.25	6.25	6.25	6.25	6.25
		NC3000			—	—	—	—	—	—
		PG100			—	—	—	—	—	—
	Hardening accelerator	2PZ			0.8	0.8	0.8	0.8	0.8	0.8
	Thermally conductive filler	DAW-45	45	5.7	—	—	—	—	—	—
		AO820	20	5.2	180	120	120	—	180	180
		AO509	9	5.4	—	—	—	—	—	—
		AO502	0.7	5.5	—	—	—	—	—	—
		FAN-50	50	10.5	—	—	—	—	—	—
		FAN-30	30	10.5	33	33	—	140	—	33
		FAN-05	5	10.2	—	—	33	—	—	—
		HP-40	8	6.8	—	—	—	—	—	—
		MBN-010T	0.9	7.5	25	25	25	25	25	25
	Amount of thermally conductive filler with an average particle diameter of 6 mm or more added (vol.%)				63	55	42	58	58	63
	Amount of thermally conductive filler with an average particle diameter of 6 to 15 mm added (vol.%)				0	0	0	0	0	0
	Amount of thermally conductive filler with an average particle diameter of 30 mm or more added (vol.%)				12	14	0	57	0	12
	Amount of thermally conductive filler added (vol.%)				76	71	71	72	73	76

~~72~~

[0122]

[Table 4]

Items			Average particle diameter (mm)	pH	Comparative Example 1	Comparative Example 2	Comparative Example 3	Comparative Example 4
Polyimide composition (mole ratio)	Tetracarboxylic acid dianhydride	ODPA			95	95	95	95
	Diamine represented by formula (1)	D400			–	–	–	–
		Elastomer 1000			–	60	60	60
	Diamine represented by formula (2)	SiDA			70	30	30	30
	Other diamines	MBAA			–	–	–	–
		BAHF			30	10	10	10
Polyimide Imidization ratio (%)					99	99	99	99
Polyimide weight-average molecular weight					26700	29000	29000	29000
Adhesive resin composition (parts by weight)	(A) polyimide				6.25	25	6.25	6.25
	(B) epoxy resin	EPICLON850S			12.5	–	12.5	12.5
		EXA-4850-150			6.25	–	6.25	6.25
	Hardening accelerator	2PZ			0.8	–	0.8	0.8
	(C) thermally conductive filler	DAW-45	45	5.7	–	–	–	–
		AO820	20	5.2	180	180	–	–
		AO509	9	5.4	–	–	–	–
		AO502	0.7	5.5	–	–	83	–
		FAN-30	30	10.5	–	–	–	–
		FAN-05	5	10.2	–	–	–	–
		HP-40	8	6.8	–	–	–	35
		MBN-010T	0.9	7.5	25	25	–	25
	Amount of thermally conductive filler with an average particle diameter of 6 mm or more added (vol.%)				58	58	0	33
	Amount of thermally conductive filler added (vol.%)				73	73	50	56

[0124]

[Table 6]

Items	Example 11	Example 12	Example 13	Example 14	Example 15	Example 16	Example 17	Example 18	Example 19	Example 20	Example 21	Example 22	Example 23	Example 24	Example 25	Example 26	Comparative Example 1	Comparative Example 2
Sticking property	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	×	×
Adhesive strength (N/cm)	8.8	8.8	9.2	9.0	9.0	8.5	9.2	8.5	7.8	9.9	6.4	7.2	7.5	5.8	6.2	4.9	–	–
Thermal Conductivity (W/mK)	9.2	9.5	11.2	10.9	13.3	10.5	10.9	11.0	11.0	5.2	8.9	6.4	5.6	4.5	6.3	8.8	6.0	6.2
Withstand voltage (kV)	5.0	6.0	4.9	5.4	4.8	4.6	5.2	6	6.5	5.2	1.0	2.0	1.6	1.2	2.2	1.2	1.1	1.5

[0125]

[Table 7]

Items	Example 27	Example 28	Example 29	Example 30	Example 31	Example 32	Example 33	Example 34	Example 35	Example 36	Example 37	Example 38	Example 39
Sticking property	○	○	○	○	○	○	○	○	○	○	○	○	○
Adhesive strength (N/cm)	8.2	8.5	8.2	8.9	9.0	8.6	9.0	9.0	9.2	8.8	9.0	8.8	7.8
Thermal Conductivity (W/mK)	6.6	7.4	8.4	9	9.0	9.8	11.2	10.6	13.2	10.5	10.9	10.8	11.0
Withstand voltage (kV)	2.3	4.1	3.6	4.6	5.0	6.5	5.2	5.4	4.8	4.9	5.0	6.0	6.8

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