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[54] **NONLINEAR OPTICAL MATERIALS CONTAINING POLAR DISULFONE-FUNCTIONALIZED MOLECULES**

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Related U.S. Application Data

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[52] **U.S. Cl.** **252/582**; 544/98; 544/158; 546/94; 546/95; 546/165; 546/166; 546/172; 546/180; 546/207; 546/212; 548/179; 548/420; 548/469; 548/491; 548/509; 548/517; 548/562; 549/21; 549/427; 568/25; 568/35

[58] **Field of Search** 252/582, 587; 544/98, 158; 568/25, 35; 546/94, 95, 165, 166, 172, 180, 207, 212; 548/420, 469, 491, 509, 517, 562, 179; 549/427, 21

[56] **References Cited**

U.S. PATENT DOCUMENTS

3,917,714	11/1975	Richmond	260/607 A
3,932,526	1/1976	Koshar	260/607 A
3,933,914	1/1976	Coles et al.	260/577
3,984,357	10/1976	Koshar	260/2 R
4,069,233	1/1978	Koshar	260/347.2
4,156,696	5/1979	Koshar	260/592
4,357,405	11/1982	Leichter et al.	430/58
4,859,876	8/1989	Dirk et al.	307/425
4,973,429	11/1990	Decher et al.	252/587
5,006,729	4/1991	Meijer et al.	307/425

FOREIGN PATENT DOCUMENTS

0 218 938	4/1987	European Pat. Off.	G02F 1/35
0 396 172 A1	11/1990	European Pat. Off.	C08F 220/34

OTHER PUBLICATIONS

Fild et al., Chemical Abstracts 110: 135357, Abstract of Chem.—ZTG. (1988), 112 (3), pp. 107–108.

I.I. Malentina et al., Inst. Org. Chem., Acad. Sci. Ukranian SSR, Plenum Publishing (1980) (translated from Zhurnal Organicheskoi Khimii, v. 15, n. 11, pp. 2416–2417 (Nov. 1979)).

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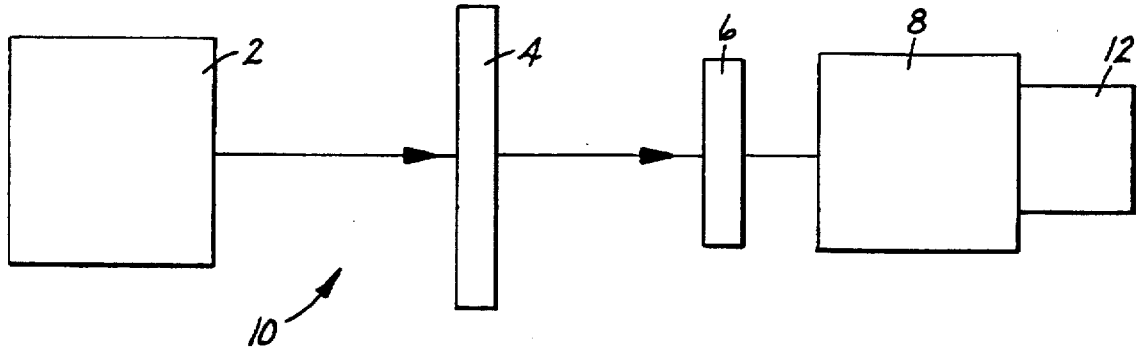
[57] **ABSTRACT**

Nonlinear optical (NLO) compositions are disclosed which contain polar disulfone-functionalized molecules (PDFMs) incorporated in a polymeric material. when aligned noncentrosymmetrically in the polymeric material, the PDFMs generate a second-order NLO response. There is also disclosed: a method of preparing a NLO composition; novel PDFMs and novel polymers; and a new process for preparing PDFMs.

6 Claims, 1 Drawing Sheet