US006589550B1

(12) **United States Patent**
Hodd et al.

(10) **Patent No.: US 6,589,550 B1**
(45) **Date of Patent: Jul. 8, 2003**

(54) **METHODS OF PRODUCING INTRAOCULAR LENSES AND MATERIALS SUITABLE FOR THEIR PRODUCTION**

(75) Inventors: **Kenneth A. Hodd**, Wrexham (GB); **Keith Alfred Dillingham**, Groningen (NL); **Jacqueline de Groot**, SR Leek (NL)

(73) Assignee: **Pharmacia Groningen BV**, Groningen (NL)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/623,577**

(22) PCT Filed: **Mar. 16, 1999**

(86) PCT No.: **PCT/EP99/01766**

§ 371 (c)(1),
(2), (4) Date: **Oct. 25, 2000**

(87) PCT Pub. No.: **WO99/47185**

PCT Pub. Date: **Sep. 23, 1999**

(30) **Foreign Application Priority Data**

Mar. 16, 1998 (SE) 9800853

(51) **Int. Cl.**[7] **A61K 9/00**; A61K 9/08; A61F 9/00

(52) **U.S. Cl.** **424/429**; 424/422; 424/427; 424/78.08; 424/78.17; 424/78.24; 424/489; 424/486; 424/484; 424/423; 514/952; 514/954

(58) **Field of Search** 424/422, 3, 427, 424/429, 78.08, 78.17, 78.24, 489, 486, 484

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,542,542 A		9/1985	Wright	
4,787,904 A		11/1988	Severin et al.	
5,147,394 A		9/1992	Siepser et al.	
5,224,957 A		7/1993	Gasser et al.	
5,665,840 A		9/1997	Pohlmann et al.	
5,945,498 A	*	8/1999	Hopken et al.	528/42
6,015,842 A	*	1/2000	LeBoeuf et al.	522/64

FOREIGN PATENT DOCUMENTS

EP	0414219	2/1993
GB	2090264	12/1981
WO	9302639	2/1993
WO	9624074	8/1996
WO	WO-96-24074 A1 *	8/1996

OTHER PUBLICATIONS

Graham et al., Nanogels and Microgels: The new polymeric materials playground, *Pure & Appl. Chem.*, vol. 70, No. 6, pp. 1271–1275, 1998.

Fisher, The Elastic Constants of the Human Lens, *J. Physiol.* (1971), 212, pp. 147–180.

van Alphen et al., Elasticity of Tissues Involved In Accommodation, *Vision Res.* vol. 31, No. 7/8, pp. 1417–1438, 1991.

* cited by examiner

Primary Examiner—James M. Spear
Assistant Examiner—Liliana Di Nola-Baron
(74) *Attorney, Agent, or Firm*—Dinsmore & Shohl LLP

(57) **ABSTRACT**

A method for producing an intraocular lens, comprising the steps of injecting a high-refractive index, low viscosity composition of crosslinkable units into an enclosure and initiating polymerization under pressure to create a synthetic polymer lens. The method is especially suitable for producing an intraocular lens directly in the capsular bag of the eye from an injected aqueous solution of macromolecular particles, which can undergo a crosslinking reaction to a solid lens when exposed to light.

23 Claims, No Drawings