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(54) **ELECTRO-ACTIVE INTRAOCULAR LENSES**

(75) Inventors: **Ronald D. Blum**, Roanoke, VA (US);
William Kokonaski, Gig Harbor, WA (US)

(73) Assignee: **e-Vision Smart Optics Inc.**, Sarasota, FL (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 825 days.

3,248,460 A	4/1966	Naujokas
3,309,162 A	3/1967	Kosanke et al.
3,614,215 A	10/1971	Mackta
3,738,734 A	6/1973	Tait et al.
3,791,719 A	2/1974	Kratzer et al.
4,062,629 A	12/1977	Winthrop
4,174,156 A	11/1979	Glorieux
4,181,408 A	1/1980	Senders
4,190,330 A	2/1980	Berreman
4,190,621 A	2/1980	Greshes
4,264,154 A	4/1981	Petersen
4,279,474 A	7/1981	Belgorod
4,300,818 A	11/1981	Schachar
4,320,939 A	3/1982	Mueller

(Continued)

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USPC **623/6.22; 623/6.27; 623/6.37**

(58) **Field of Classification Search**
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See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

2,437,642 A	3/1948	Henroleau
2,576,581 A	11/1951	Edwards
3,161,718 A	12/1964	De Luca
3,245,315 A	4/1966	Marks et al.

FOREIGN PATENT DOCUMENTS

CN	1466934 A	1/2004
DE	4223395	1/1994

(Continued)

OTHER PUBLICATIONS

ISA/US, Search Report and Written Opinion for application PCT/US05/39101, Jul. 7, 2006.

(Continued)

Primary Examiner — Andrew Iwamaye
Assistant Examiner — Leslie Coburn
(74) *Attorney, Agent, or Firm* — Cooley LLP

(57) **ABSTRACT**

An intraocular system is presented that may include an electro-active element having multiple independently controllable zones or pixels, and a controller capable of being remotely programmed. The system or element may be flexible, such that it can be folded for insertion into the eye. The system may include various energy storage and charging mechanisms to provide power to the lens and/or the controller.

15 Claims, 10 Drawing Sheets

