

(12) **United States Patent**  
**Altmann**

(10) **Patent No.:** **US 8,535,376 B2**  
(45) **Date of Patent:** **\*Sep. 17, 2013**

(54) **ASPHERIC LENSES AND LENS FAMILY**  
(75) Inventor: **Griffith E. Altmann**, Pittsford, NY (US)  
(73) Assignee: **Bausch & Lomb Incorporated**,  
Rochester, NY (US)

(\* ) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 9 days.  
  
This patent is subject to a terminal disclaimer.

(21) Appl. No.: **12/913,863**  
(22) Filed: **Oct. 28, 2010**

(65) **Prior Publication Data**  
US 2011/0098810 A1 Apr. 28, 2011

**Related U.S. Application Data**  
(63) Continuation of application No. 11/248,052, filed on Oct. 12, 2005, now Pat. No. 7,905,917, which is a continuation-in-part of application No. 11/057,278, filed on Feb. 11, 2005, now abandoned, which is a continuation-in-part of application No. 11/054,823, filed on Feb. 10, 2005, now abandoned, which is a continuation-in-part of application No. 10/703,884, filed on Nov. 7, 2003, now abandoned, which is a continuation-in-part of application No. 10/403,808, filed on Mar. 31, 2003, now abandoned.

(51) **Int. Cl.**  
**A61F 2/16** (2006.01)  
**G02C 7/10** (2006.01)  
(52) **U.S. Cl.**  
USPC ..... **623/6.23**; 351/165  
(58) **Field of Classification Search**  
USPC ..... 623/6.11–6.38; 351/165  
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS  
4,504,982 A 3/1985 Burk  
4,710,193 A 12/1987 Volk

(Continued)

FOREIGN PATENT DOCUMENTS  
EP 1424049 6/2004  
WO 92/17134 10/1992

(Continued)

OTHER PUBLICATIONS  
CVI Melles Griot Optics Guide—Spherical Aberration [http://www.mellesgriot.com/products/optics/fo\\_3\\_2\\_1.htm](http://www.mellesgriot.com/products/optics/fo_3_2_1.htm).

(Continued)

*Primary Examiner* — Suzette J Gherbi  
(74) *Attorney, Agent, or Firm* — Jeffrey B Powers

(57) **ABSTRACT**

In an embodiment, an aspheric IOL for use in a pseudophakic ocular system has no inherent spherical aberration. In an embodiment, an aspheric IOL for use in a pseudophakic ocular system has a controlled amount of inherent negative spherical aberration such that the IOL induces no spherical aberration in a converging wavefront from a cornea passing through the lens. An embodiment of the invention is directed to a family of aspheric IOLs made up of any two or more member aspheric IOLs each having different spherical aberration values and different lens shape factors. A lens constant, such as the well known A-constant, is kept constant throughout the family of lenses. An embodiment of the invention is directed to a multi-component accommodating intraocular lens (A-IOL). In a particular embodiment, the A-IOL introduces substantially no residual spherical aberration to a wavefront incident upon and passing through the A-IOL.

**18 Claims, 45 Drawing Sheets**

