



US006680795B2

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

(10) **Patent No.:** **US 6,680,795 B2**  
(45) **Date of Patent:** **Jan. 20, 2004**

(54) **UNDERWATER MICROSCOPE SYSTEM**

(56) **References Cited**

(75) Inventors: **Henry Chezar, Palo Alto, CA (US);**  
**David Rubin, Santa Cruz, CA (US)**

**U.S. PATENT DOCUMENTS**

(73) Assignee: **The United States of America as**  
**represented by the Secretary of the**  
**Interior, Washington, DC (US)**

2,019,059 A	*	10/1935	Sherman	114/331
3,619,036 A	*	11/1971	Baker	359/775
5,129,268 A	*	7/1992	Uesugi et al.	356/335
5,604,582 A	*	2/1997	Rhoads et al.	356/73
D411,217 S	*	6/1999	McBride	396/25
6,191,853 B1	*	2/2001	Yamaguchi et al.	250/575
6,313,943 B1	*	11/2001	Ikado et al.	359/363

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

\* cited by examiner

(21) Appl. No.: **09/931,182**

*Primary Examiner*—Mark A. Robinson

(22) Filed: **Aug. 17, 2001**

*Assistant Examiner*—Lee Fineman

(65) **Prior Publication Data**

US 2002/0071174 A1 Jun. 13, 2002

(74) *Attorney, Agent, or Firm*—Ross F. Hunt, Jr.

**Related U.S. Application Data**

(60) Provisional application No. 60/227,014, filed on Aug. 23, 2000.

(57) **ABSTRACT**

An apparatus and a method are provided for capturing and analyzing video images of sediment from the bottom of a body of water such as a river or sea. The apparatus includes a video imager with a close-up focus of lens adapted to collect images of sediment at the bottom of the body of water. A waterproof housing surrounds the video imager. The video images are analyzed using any appropriate algorithm to determine grain size.

(51) **Int. Cl.**<sup>7</sup> ..... **G02B 21/00**

(52) **U.S. Cl.** ..... **359/368; 359/363; 73/170.32**

(58) **Field of Search** ..... **359/363, 368,**  
**359/894, 895, 802-820; D16/204; 73/170.32,**  
**170.33; 175/49; 348/81; 396/25, 28**

**20 Claims, 4 Drawing Sheets**

