

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
1 September 2005 (01.09.2005)

PCT

(10) International Publication Number  
**WO 2005/079187 A3**

(51) International Patent Classification:  
*H01L 41/08* (2006.01)

(21) International Application Number:  
PCT/US2004/028929

(22) International Filing Date:  
1 September 2004 (01.09.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:  
60/500,148 3 September 2003 (03.09.2003) US

(71) Applicant (for all designated States except US): **SRI INTERNATIONAL** [US/US]; 333 Ravenswood Avenue, Menlo Park, CA 94025 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **PELRINE, Ronald, E.** [US/US]; 802 Owl Drive, Louisville, CO 80027 (US). **KORNBLUH, Roy, D.** [US/US]; 260 Palo Alto Drive, Palo Alto, CA 94301 (US). **PRAHLAD, Harsha** [IN/US]; 799 Stendhal Lane, Cupertino, CA 95014 (US).

(74) Agent: **WEAVER, Jeffrey, K.**; Beyer Weaver & Thomas, LLP, P.O. Box 70250, Oakland, CA 94612-0250 (US).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM,

AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

**Published:**

- with international search report
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

(88) Date of publication of the international search report:  
8 November 2007

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.



WO 2005/079187 A3

(54) Title: SURFACE DEFORMATION ELECTROACTIVE POLYMER TRANSDUCERS

(57) Abstract: The present invention provides electroactive polymer transducers that produce out-of-plane deflections. The transducers form a set of surface features based on deflection of an electroactive polymer. The set of surface features may include elevated polymer surface features and/or depressed electrode surface features. Actuation of an active area may produce the polymer deflection that creates one or more surface features. A passive layer may operably connect to a polymer. The passive layer may comprise a thicker and softer material to amplify polymer thickness changes and increase surface feature visibility.

**INTERNATIONAL SEARCH REPORT**

International application No.

PCT/US04/28929

**A. CLASSIFICATION OF SUBJECT MATTER**

IPC: **H01L 4108**

USPC: 310/328,309,311

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 310/328,309,311

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)  
EAST

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 6812624 (PEI et.al) 2 NOVEMBER 2004(2.11.2004) ENTIRE REFERENCE.	1-55
A	US 7034432 B1(PERLINE et.al) 25 APRIL 2006(25.04.2006) entire reference.	1-55
A		

Further documents are listed in the continuation of Box C.

See patent family annex.

* Special categories of cited documents:	
"A" document defining the general state of the art which is not considered to be of particular relevance	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"E" earlier application or patent published on or after the international filing date	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"O" document referring to an oral disclosure, use, exhibition or other means	
"P" document published prior to the international filing date but later than the priority date claimed	"&" document member of the same patent family

Date of the actual completion of the international search  
25 June 2007 (25.06.2007)

Date of mailing of the international search report  
20 SEP 2007

Name and mailing address of the ISA/US  
Mail Stop PCT, Attn: ISA/US  
Commissioner of Patents  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
Facsimile No. (571) 273-3201

Authorized officer *Darren Schuberg*  
Darren Schuberg  
Telephone No. 703-308-0956