

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
25 September 2008 (25.09.2008)

PCT

(10) International Publication Number
WO 2008/116173 A1

(51) International Patent Classification:
H01L 41/00 (2006.01)

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(21) International Application Number:
PCT/US2008/057865

(81) Designated States (*unless otherwise indicated, for every kind of national protection available*): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(22) International Filing Date: 21 March 2008 (21.03.2008)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/896,077 21 March 2007 (21.03.2007) US

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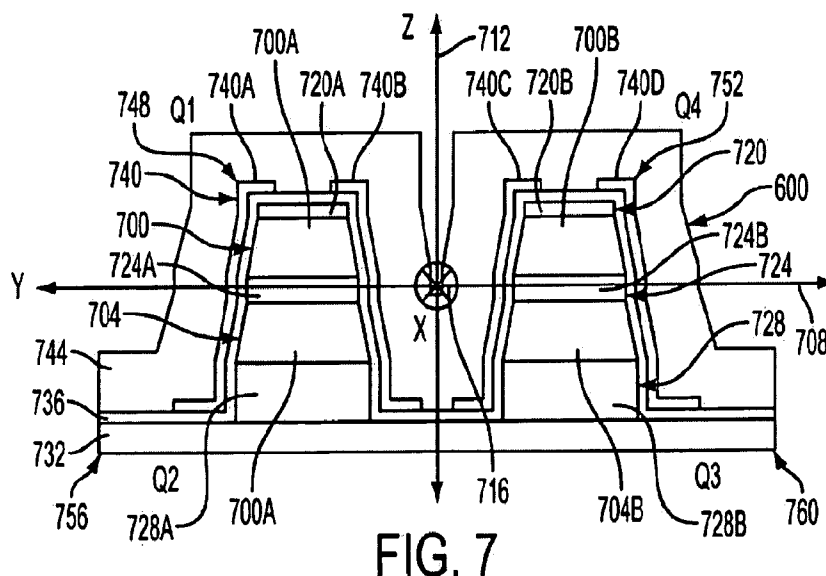
(84) Designated States (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, NO, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

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Published:
— with international search report

(54) Title: **PIEZOELECTRIC VIBRATIONAL ENERGY HARVESTING SYSTEMS INCORPORATING PARAMETRIC BENDING MODE ENERGY HARVESTING**



(57) Abstract: Vibrational energy harvesting (VEH) structures that include resonant beams each having a fundamental resonance frequency and a parametric mode frequency and including at least one piezoelectric layer for generating electrical charge in response to each of fundamental-resonance excitation and parametric-mode excitation of that beam. Circuitry is provided for harvesting the electrical charge from the resonant beam. In some embodiments, the parametric mode frequency of the beam is tuned to be close to its fundamental resonance frequency so as to increase the effective bandwidth of a VEH structure. The effective bandwidth of a VEH structure can be further increased by tuning ones of multiple parametric-mode-enabled resonant beams to slightly different fundamental resonance frequencies and parametric mode frequencies.