

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
3 July 2003 (03.07.2003)

PCT

(10) International Publication Number
WO 03/054958 A1

(51) International Patent Classification⁷: **H01L 23/433**,
23/373, C01B 31/02

(21) International Application Number: PCT/US02/40515

(22) International Filing Date:
17 December 2002 (17.12.2002)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
10/027,442 20 December 2001 (20.12.2001) US

(71) Applicant: **INTEL CORPORATION** [US/US]; (a
Delaware Corporation), 2200 Mission College Boulevard,
Santa Clara, CA 95052 (US).

(72) Inventors: **MONTGOMERY, Stephen**; 1821 6th Avenue
Westt.#7, Seattle, WA 98119 (US). **HOLAKERE, Ven**;
4550 Central Parkway, Dublin, CA 94568 (US).

(74) Agent: **STEFFEY, Charles, E.**; Schwegman, Lundberg,
Woessner & Kluth, P.A., P.O. Box 2938, Minneapolis, MN
55402 (US).

(81) Designated States (*national*): AE, AG, AL, AM, AT, AU,
AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU,
CZ, DE, DK, DM, DZ, EC, EE, 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, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE,
SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC,
VN, YU, ZA, ZM, ZW.

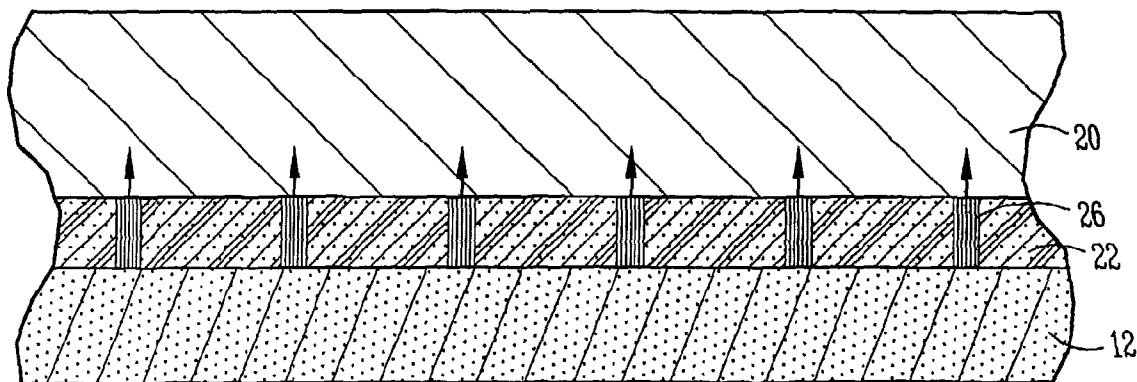
(84) Designated States (*regional*): ARIPO patent (GH, GM,
KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW),
Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),
European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE,
ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, SI, SK,
TR), OAPI patent (BF, BJ, CF, CG,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

Published:

— with international search report

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.

(54) Title: CARBON NANOTUBE THERMAL INTERFACE STRUCTURES



(57) Abstract: The invention relates to a process of forming a thermal interface that employs carbon nanotubes to reduce thermal resistance between an electronic device and a cooling solution. Bundles of aligned nanotubes receive injected polymeric material to produce a polymeric/carbon composite which is then placed between the electronic device and a heat sink or other cooling solution.



WO 03/054958 A1