(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
28 July 2005 (28.07.2005)

PCT

(10) International Publication Number
WO 2005/069362 A1

(51) International Patent Classification[7]: H01L 21/336, 21/266

(21) International Application Number: PCT/US2004/035407

(22) International Filing Date: 26 October 2004 (26.10.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
10/747,680 30 December 2003 (30.12.2003) US

(71) Applicant *(for all designated States except US)*: **ADVANCED MICRO DEVICES, INC.** [US/US]; One AMD Place, Mail Stop 68, P.O. Box 3453, Sunnyvale, CA 94088-3453 (US).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **ZHONG, Huicai** [CN/US]; 509 Popula Blvd., Wappingers Falls, NY 12590 (US). **DAKSHINA-MURTHY, Srikanteswara** [IN/US]; 258 Town View Drive, Wappingers Falls, NY 12590 (US).

(74) Agent: **DRAKE, Paul, S.**; One AMD Place, Mail Stop 68, P.O. Box 3453, Sunnyvale, CA 94088-3453 (US).

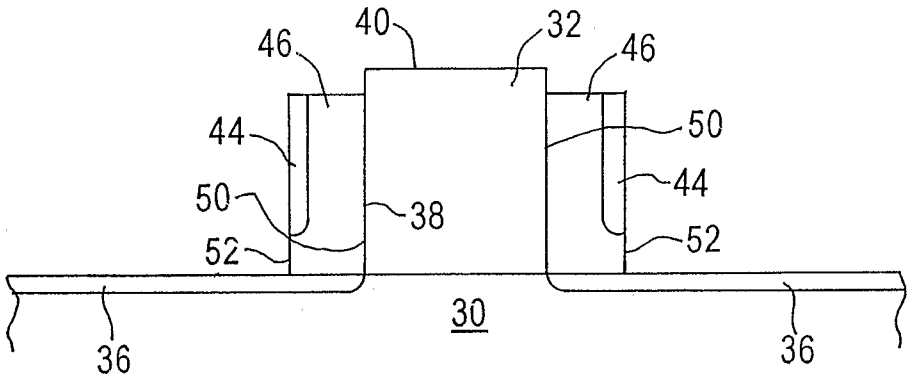
(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, 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*

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: A METHOD FOR FORMING RECTANGULAR-SHAPE SPACERS FOR SEMICONDUCTOR DEVICES



(57) Abstract: A semiconductor device and method of making the same forms a spacer (46) by depositing a spacer layer (34) over a substrate (30) and a gate electrode (32) and forms a protective layer (42) on the spacer layer (34). The protective layer (42) is dry etched to leave a thin film sidewall on the spacer layer (34). The spacer layer (34) is then etched, with the protective layer (42) protecting the outer sidewalls of the spacer layer (34). This etching creates spacers (46) on the gate that have substantially vertical sidewalls (52) that extend parallel to the gate electrode sidewalls (38). The I-shape of the spacers (46) prevent punch-through during the source/drain ion implantation process, providing an improved source/drain implant dose profile.

WO 2005/069362 A1