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(21) International Application Number: PCT/AU99/00368 (22) International Filing Date: 17 May 1999 (17.05.99) (30) Priority Data: PP 3557 15 May 1998 (15.05.98) AU (71) Applicant (for all designated States except US): THE UNIVERSITY OF WESTERN AUSTRALIA [AU/AU]; Nedlands, W.A. 6907 (AU). (72) Inventors; and (75) Inventors/Applicants (for US only): McCORMICK, Paul, Gerard [US/AU]; (AU). TZUZUKI, Takuya [JP/AU]; The University of Western Australia, Nedlands, W.A. 6907 (AU). (74) Agent: VAN WOLLINGEN, Rolf; Griffith Hack, 6th floor, 256 Adelaide Terrace, Perth, W.A. 6000 (AU).	(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, 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, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG). Published <i>With international search report.</i>	

(54) Title: PROCESS FOR THE PRODUCTION OF ULTRAFINE POWDERS**(57) Abstract**

A process for the production of ultra-fine powders consisting of individual particles with sizes in the range of 1 nm to 200 nm, which is based on the mechanical milling of two or more non-reacting powders. The process includes subjecting a suitable precursor metal compound and a non-reactant diluent phased to mechanical milling which through the process of mechanical activation reduces the microstructure of the mixture of the form of nano-sized grains of the metal compound uniformly dispersed in the diluent phase. Heat treating the milled powder converts the nano-sized grains of the precursor metal compound into a desired metal oxide phase. Alternatively, the precursor metal compound may itself be an oxide phase which has the requisite milling properties to form nanograins when milled with a diluent. An ultrafine powder is produced by removing the diluent phase such that nano-sized grains of the desired metal oxide phase are left behind. The process facilitates a significant degree of control over the particle size and size distribution of the particles in the ultrafine powder by controlling the parameters of mechanical activation and heat treatment.

