

TABLE S8-26

## USPTO patents and patent families granted in microstructural and nanotechnology, by region, country, or economy: 1998–2018

(Number)

Region, country, or economy	1998		1999		2000		2001		2002		2003		2004		2005		2006		2007		2008		2009		2010		2011		2012		2013		2014		2015		2016		2017		2018								
	USPTO patents	Patent families	USPTO patents	Patent families	USPTO patents	Patent families	USPTO patents	Patent families	USPTO patents	Patent families	USPTO patents	Patent families	USPTO patents	Patent families	USPTO patents	Patent families	USPTO patents	Patent families	USPTO patents	Patent families	USPTO patents	Patent families	USPTO patents	Patent families	USPTO patents	Patent families	USPTO patents	Patent families	USPTO patents	Patent families	USPTO patents	Patent families	USPTO patents	Patent families	USPTO patents	Patent families	USPTO patents	Patent families	USPTO patents	Patent families									
World	411	51	440	84	473	95	578	122	683	161	888	233	1,013	293	953	339	1,117	439	1,021	566	1,042	574	1,126	614	1,475	870	1,442	1,302	1,394	1,425	1,541	1,558	1,655	1,790	1,464	1,872	1,263	1,993	1,118	1,958	876	1,644							
North America	201	17	214	25	239	39	310	51	371	61	505	101	570	100	552	76	612	39	561	573	22	572	19	701	30	672	44	655	54	733	84	787	133	697	140	535	123	599	123	397	58	58							
Canada	3	1	5	1	5	1	5	1	2	0	15	5	15	2	14	2	16	1	12	0	17	0	10	0	22	2	22	2	24	6	22	5	20	4	22	5	20	4	14	2	8	2							
Mexico	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0				
Puerto Rico	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
United States	198	17	209	24	234	38	305	51	369	61	490	96	555	98	538	74	596	38	548	20	555	22	561	19	678	29	650	42	633	52	712	81	761	127	674	135	579	117	520	92	388	52	52						
All others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
Central and South America	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Argentina	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Brazil	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
All others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Europe	66	4	52	8	51	8	59	17	74	19	86	29	101	39	101	66	117	71	114	109	109	120	125	180	203	229	207	282	207	278	238	304	246	319	243	374	213	323	203	369	181	331	331	331					
EU	60	4	48	8	45	7	52	15	68	18	76	22	89	29	93	59	104	58	106	87	96	68	116	68	184	74	186	91	193	112	221	109	225	120	224	136	193	154	188	138	168	137	137						
Austria	1	0	0	0	1	0	0	0	0	0	0	0	1	0	1	0	2	1	2	1	3	1	2	1	5	1	5	3	6	3	5	2	2	1	6	3	3	3	1	5	3	7	5	5	5				
Belgium	2	0	1	0	0	0	1	0	2	0	0	0	3	0	1	0	3	0	2	0	3	0	5	0	8	0	10	0	10	1	12	0	8	1	9	3	7	1	8	0	8	5	5	5					
Denmark	0	0	0	0	0	0	0	0	1	0	0	0	1	0	2	0	0	0	2	0	3	0	2	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Finland	1	0	1	0	0	0	1	1	2	1	1	1	2	1	2	1	1	1	2	1	0	2	2	2	1	2	2	4	2	5	0	3	1	2	4	2	5	3	9	7	3	3	2	2	2				
France	17	1	13	2	10	1	9	1	12	4	12	7	14	7	15	18	13	24	14	31	13	25	18	26	46	26	42	24	40	30	38	27	45	32	44	37	35	29	28	35	28	26	26	26					
Germany	19	2	17	4	17	5	21	10	27	11	37	9	36	10	41	29	47	27	49	45	41	25	45	18	64	28	62	34	73	31	82	37	86	37	85	38	69	51	72	46	71	50	50						
Hungary	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Ireland	0	0	0	0	0	0	1	0	1	0	1	0	1	0	0	0	2	0	0	0	0	1	0	1	0	2	0	1	0	2	0	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Italy	2	0	1	1	1	0	3	2	4	0	2	1	5	4	3	1	7	2	8	5	8	5	5	0	10	2	14	2	7	2	13	1	13	2	16	2	14	2	14	1	15	2	12	1	1	1			
Netherlands	4	0	3	0	1	0	6	0	5	0	5	1	5	2	6	2	9	0	11	0	10	1	14	2	20	1	15	1	22	1	26	3	24	2	16	1	20	3	18	2	13	1	1	1					
Spain	0	0	1	0	1	0	2	0	1	0	1	0	1	1	0	1	0	0	0	2	1	2	1	2	2	3	2	5	1	15	0	12	5	13	4	5	13	4	12	3	9	2	8	8					
Sweden	2	0	1	0	5	1	3	2	3	0	3	1	5	3	4	0	3	0	4	0	4	0	5	1	6	2	8	3	10	3	7	1	9	5	6	5	6	4	0	3	2	3	2	2	2				
United Kingdom	9	0	9	0	8	0	6	0	10	0	10	0	14	0	16	2	15	1	12	0	10	2	15	2	17	1	15	3	14	5	21	4	25	3	22	6	19	6	20	4	14	4	14	4	4				
All others	1	0	0	0	0	0	0	0	1	1	0	1	2	1	2	1	2	1	2	1	5	1	12	2	9	5	12	2	19	3	26	7	26	4	25	7	41	2	27	0	31	31	31	31					
Other Europe	6	0	5	1	6	1	10	7	11	10	8	7	12	12	8	7	12	7	22	13	52	9	112	18	155	21	190	14	166	16	200	18	195	20	200	18	238	20	169	15	231	13	194	194					
Former Soviet Union	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	2	0	3	1	3	0	5	0	4	0	6	1	6	1	7	8	1	8	1	7	1	11	0	10	0	8	0	10	10					
Norway	1	0	0	0	1	0	1	0	1	1	0	0	2	1	0	0	2	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0		
Russia	1	0	1	0	2	1	2	1	2	0	2	6	2	2	2	3	2	2	8	1	16	3	46	2	108	2	147	4	183	3	223	4	188	3	223	4	157	3	216	1	177	177	177						
Switzerland	5	0	3	0	3	0	4	0	3	0	6	1	7	2	6	1	7	1	4	2	8	1	5	0	14	0	15	3	10	2	10	3	14	4	13	3	14	2	10	5	10	7	7	7					
All others	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Asia	141	29	169	50	177	48	191	53	229	77	286	103	330	153	285	193	368	327	328	436	347	430	410	413	553	609	540	973	513	1,089	544	1,164	594	1,331	498	1,351	428	1,539	359	1,487	278	1,241	1,241						

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	USPTO patents	Patent families	USPTO patents	Patent families	USPTO patents	Patent families	USPTO patents	Patent families	USPTO patents	Patent families	USPTO patents	Patent families	USPTO patents	Patent families	USPTO patents	Patent families	USPTO patents	Patent families	USPTO patents	Patent families	USPTO patents	Patent families	USPTO patents	Patent families	USPTO patents	Patent families	USPTO patents	Patent families	USPTO patents	Patent families	USPTO patents	Patent families	USPTO patents	Patent families	USPTO patents	Patent families	USPTO patents	Patent families	USPTO patents	Patent families		
China	1	0	0	0	0	0	0	0	1	1	1	1	3	12	3	21	8	53	7	53	17	167	23	176	22	285	29	429	47	522	65	703	60	935	59	1,173	59	1,179	41	988		
India	0	0	0	0	0	0	0	0	1	0	1	0	2	0	1	0	2	0	2	1	2	0	1	2	4	2	4	2	8	5	9	2	6	2	6	2	7	1				
Japan	130	28	155	47	160	42	172	48	193	56	245	54	264	55	229	57	277	75	237	99	236	96	274	131	360	190	353	201	310	240	300	216	300	172	214	113	172	133	114	112	87	99
Malaysia	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	0	0	1	0	0	0	2	0	0	3	1	1	1	4	1	4	1	2	1	2	1	2	4	
Singapore	0	0	1	1	0	0	1	1	2	1	4	1	3	1	3	0	3	1	4	1	4	0	4	0	6	0	8	0	4	0	8	0	13	2	11	3	14	2	13	3	8	1
South Korea	9	1	11	2	6	1	13	3	20	3	26	24	38	57	33	93	51	171	42	243	63	213	82	100	113	222	113	454	91	378	104	361	114	367	110	198	86	145	73	117	56	94
Taiwan	1	0	3	1	10	5	5	3	12	17	9	23	19	28	15	22	37	33	21	30	14	30	49	19	46	79	60	93	77	79	93	60	93	77	93	94	81	91	71	77	53	
All others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	1	0	0	1	0	2	0	2	1	1	0	3	1	1	1	1	1	1	1	2		
Middle East	2	0	3	0	3	0	4	0	2	0	5	0	5	0	3	0	3	0	1	5	1	7	0	7	0	11	1	17	4	16	4	3	16	3	15	3	15	3	14	5		
Israel	2	0	3	0	3	0	4	0	2	0	5	0	5	0	3	0	3	0	4	0	5	0	6	0	7	0	12	0	7	0	11	11	8	1	11	11	1	11	1	8	1	
All others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	0	2	1	4	1	5	4	5	3	8	2	4	2	4	2	4	2	6	4
Africa	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	0	0	0	0	2	0	0	1	0	0	1	1	1	1	1	1	
South Africa	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
All others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Australia and Oceania	1	0	1	0	2	0	13	0	7	4	6	0	7	1	10	2	16	1	13	0	7	1	12	1	10	1	12	1	4	1	9	2	8	2	6	2	3	2	5	2		
Australia	1	0	1	0	2	0	13	0	7	4	6	0	7	1	10	2	16	1	12	0	7	1	11	1	10	1	12	1	4	1	9	2	8	2	6	2	3	2	5	2		
New Zealand	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
All others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Unclassified	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

EU = European Union; USPTO = U.S. Patent and Trademark Office.

## Note(s)

USPTO patents are allocated according to patent inventorship information. USPTO patents are fractionally allocated among regions, countries, or economies based on the proportion of residences of all named inventors. Patents are classified under the World Intellectual Property Organization (WIPO) classification of patents, which classifies International Patent Classification (IPC) codes under 35 technical fields. IPC reformed codes take into account changes that were made to the WIPO classification in 2006 under the eighth version of the classification and were used to prepare these data. However, because PatentsView only provides the original IPC codes as they appeared on patents and not the IPC reformed codes, current Cooperative Patent Classification codes on patents were converted back to the most recent IPC classification to prepare these statistics. Fractional counts of patents were assigned to each technological field on patents to assign the proper weight of a patent to the corresponding technological fields under the classification. International Patent Documentation (INPADOC) patent families across all patent offices covered in the Worldwide Patent Statistical Database (PATSTAT) are counted according to the year of the first granted patent in the patent family. Patent families are allocated according to patent inventorship information found on the priority patent of the INPADOC patent families. To account for missing ownership information in PATSTAT for some offices, a method designed by de Rassenfosse et al. (2012) is used to fill in missing information on priority patents using information in successive filings within the patent families (see technical documentation for details). Patent families are fractionally allocated among regions, countries, or economies based on the proportion of residences of all named inventors. Because of data coverage issues for some patent offices in PATSTAT, statistics for some countries may be underestimated partially for some years or across the whole trend. Countries with identified issues include India (missing data) and South Africa (no data for 2018). For Italy, because of data gaps regarding information on granted patents, patent applications are used instead, which slightly overestimates Italy's output and creates a small shift in the year for which its output is accounted. The EU includes 28 member countries. China includes Hong Kong.

## Source(s)

Science-Matrix; PATSTAT, accessed April 2019; PatentsView, USPTO, accessed June 2019.