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Producing metal-containing nanoparticles, useful as catalyst, electrolyte or as sensor component, comprises introducing a metal carbonyl compound into an ionic liquid and decomposing the metal carbonyl compound

Patent Number(s): WO2009040107-A2 ; DE102007045878-A1 ; DE102007045878-B4 ; WO2009040107-A3

Inventor(s): [BEYERSDORFF T F](#), [JANIAK C](#), [KLINGELE M](#), [REDEL E](#), [SCHUBERT T](#), [KLINGELE M H](#)

Patent Assignee Name(s) and Code(s): UNIV FREIBURG ALBERT-LUDWIGS (UYFR-Non-standard)

IOLITEC (IOLI-Non-standard)

IOLITEC IONIC LIQUID TECHNOLOGIES GMBH (IOLI-Non-standard)

Derwent Primary Accession Number: 2009-G69421 [10]

Patents Cited by Examiner: 5

Articles Cited by Examiner: 3

Abstract: NOVELTY - Producing metal-containing nanoparticles, comprises introducing at least one metal carbonyl compound into at least one ionic liquid and decomposing the metal carbonyl compound.

USE - The metal-containing nanoparticles are useful as a catalyst, electrolyte or as sensor component with electronic, magnetic, optical and/or optoelectronic properties.

ADVANTAGE - The process produces the nanoparticles with high purities and narrow size distribution. The metal-containing nanoparticles exhibit a higher reactivity, a stronger interaction with the environment, a greater absorption capacity and a higher coupling rate.

Technology Focus/Extension Abstract: TECHNOLOGY FOCUS - INORGANIC CHEMISTRY - Preferred Components: The metal carbonyl compound is metal carbonyl and/or carbonyl group-containing metal complexes. The metal carbonyl compound contains at least one metal comprising groups of I b to VIII b of the periodic table of the elements.

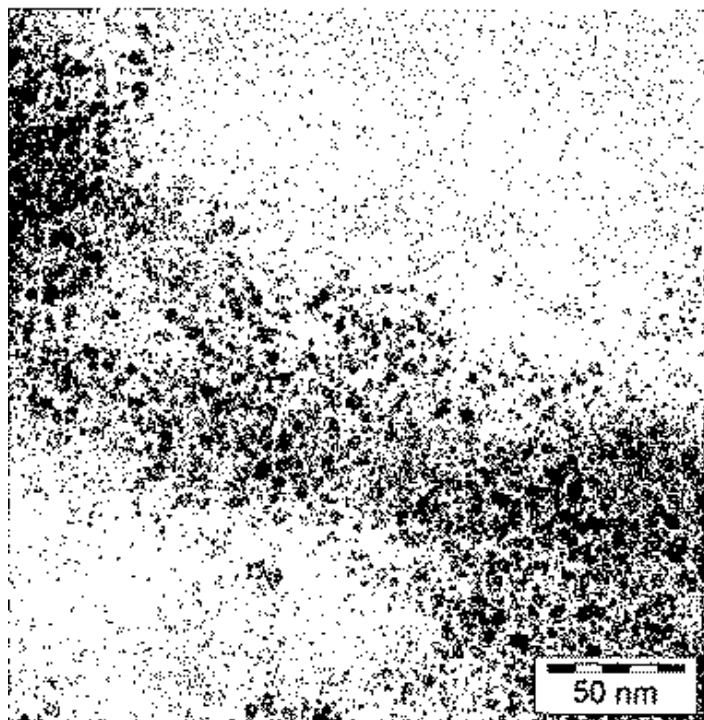
TECHNOLOGY FOCUS - ORGANIC CHEMISTRY - Preferred Process: The decomposition takes place photolytically and/or thermally. The decomposition is carried out in the presence of at least one oxidizing agent. The process is carried out in an inert gas atmosphere. Nanoparticles are separated from the obtained reaction mixture following the decomposition. The photolytic decomposition with radiation takes place in the ultraviolet range with a wavelength of 200-450 nm. The photolytic decomposition is carried out over a period of up to two hours. The thermal decomposition is carried out over a period of 10 minutes to 24 hours. The thermal decomposition takes place: at 50-350 degrees C; and gradually. A temperature difference of 35-70 degrees C is selected between the steps. Preferred Components: The oxidizing agent is air or oxygen. The inert gas atmosphere is formed from at least one inert gas comprising helium, neon and/or argon. The ionic liquid is a compound of formula ((Q-n+)m(Z-m)n) or a mixture of such salts. The ionic liquid exhibits a melting point of up to 200 degrees C, preferably up to 100 degrees C. The cation of the ionic liquid is at least an imidazolium-, ammonium-, pyrrolidinium-, piperidinium-,

pyridinium-, morpholinium-, guanidinium-, benzotriazolium-, quinolinium-, isoquinolinium-, pyrazolium-, 1,4-diazabicyclo(2.2.2)-octan-1-ium-, 1,2,4-triazolium-, pyridazinium-, pyrimidinium-, pyrazinium-, 1,3,5-triazinium-, 1,2,3-triazolium-, piperazinium-, oxazolium-, oxazolidinium-, thiazolium-, quinoxalinium-, benzimidazolium-, imidazolidinium-, indolinium-, thiomorpholinium-, tetrazolium-, phosphonium-, sulfonium-, tetrahydrothiophenium-, selenium- and/or tellurium-cation. The anion of the ionic liquid is at least one halide, polyhalide, pseudohalide, phosphate, phosphite, phosphonate, phosphinate, sulfate, sulfonate, borate, boronate, carboxylate, carbonate, alkoxide, bis(trifluoromethyl sulfonyl)imide, bis(pentafluoroethylsulfonyl)imide, tricyanomethide, tris(trifluoromethyl sulfonyl)methide, hexafluoroantimonate, hexafluoroarsenate, nitrate, nitrite, tetrachloroferrate(III), tetrabromoferrate(III), tetrachloroaluminate, heptachlorodialuminate, decachlorotrialuminate, tetrabromoaluminate, hexafluorosilicate or hexacyanoferrate(III). The ionic liquid is hydrophobic. The ionic liquid exhibits the same anion such as the metal carbonyl compound. Q-n+ = cation; Z-m = anion; and n, m = 1-4, where n is equal to m or not equal to m.

EXAMPLE - Thermal decomposition of dicobalt octacarbonyl (cobalt 34.5 wt.%) to cobalt oxide-nanoparticle was carried out in an open container. Dicobalt octacarbonyl (0.059 g) was dissolved in 1-butyl-3-methyl-imidazolium-tetrafluoroborate (2 g) under agitating. The resulting solution contained 1 wt.% of cobalt, relative to the total quantity of the reaction mixture. The mixture was heated in an oil bath at 75 degrees C (0.5 hour) to 135 degrees C (1 hour) to 180 degrees C (6-12 hours) to obtain the cobalt (oxide) nanoparticle.

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Drawing:



International Patent Classification: B22F-000/00; B22F-009/16; B22F-009/30; C01G-001/02

Derwent Class Code(s): E19 (Other organic compounds general - unknown structure, mixtures); J04 (Chemical/physical processes and apparatus including catalysis); L03 (Electro-(in)organic, chemical features of electrical devices); M22 (Casting, powder metallurgy); P53 (Metal casting, powder metallurgy); S03 (Scientific Instrumentation, photometry, calorimetry)

Derwent Manual Code(s): E34-E01; E35; J04-E04; J04-F02A; L03-B02A; L03-G09; L03-G09E; L03-J; M22-H01; S03-E03

Patent Details:

Patent Number	Publ. Date	Main IPC	Week	Page Count	Language
WO2009040107-A2	02 Apr 2009	B22F-000/00	200927	Pages: 38	German
DE102007045878-A1	16 Apr 2009	B22F-009/30	200927		German
DE102007045878-B4	18 Jun 2009	B22F-009/30	200940		German
WO2009040107-A3	09 Jul 2009	C01G-001/02	200945		English

Application Details:

WO2009040107-A2	WOEP008084	25 Sep 2008
DE102007045878-A1	DE10045878	25 Sep 2007
DE102007045878-B4	DE10045878	25 Sep 2007
WO2009040107-A3	WOEP008084	25 Sep 2008

Priority Application Information and Date:

DE10045878	25 Sep 2007
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Designated States:

WO2009040107-A2:

(National): AE; AG; AL; AM; AO; AT; AU; AZ; BA; BB; BG; BH; BR; BW; BY; BZ; CA; CH; CN; CO; CR; CU; CZ; 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; ST; SV; SY; TJ; TM; TN; TR; TT; TZ; UA; UG; US; UZ; VC; VN; ZA; ZM; ZW

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WO2009040107-A3:

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Compound(s):

DCR Number	Role	DCR Number	Role	DCR Number	Role
688-0-0-0	(K P)	581-0-0-0	(K S)	688-0-0-0	(EX PRD)
581-0-0-0	(CL RCT)				

Markush Number:

Markush Number	Role
104320501	(K P)

Derwent Compound Number(s):

Compound Number	Role	Compound Number	Role	Compound Number	Role
R01927	(K P)	RA13RU	(K P)	R02071	(K S)
RA03V6	(K S)				

Derwent Registry Number(s):

Registry Number	Role	Registry Number	Role
1927	(P)	2071	(S)

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