

Supplementary material

Table S1. Top 10 patentees in the field of healthcare and medical waste disposal technology in China.

Patentees	No.	Patent Value (USD)
Shandong Xinhua Medical Environmental Protection Equipment Ltd. (Xinhua Ltd.)	102	33,700
Beijing Da Bai Sha Environmental Protection Technology Ltd. (Da Bai Sha Ltd.)	60	137,900
Ouerdong Chaoyang Environmental Protection Group Inc. (Ouerdong Inc.)	53	176,800
Henan Liying Environmental Protection Technology Inc. (Liying Inc.)	52	85,000
Beikong Annaide Environmental Protection Technology Development Changzhou Ltd. (Beikong Annaide Ltd.)	50	33,200
Beijing Runtai Environmental Protection Technology Ltd. (Runtai Ltd.)	43	24,800
Changde Anbang Medical Waste Disposal Ltd. (Anbang Ltd.)	24	37,100
Changsha Huiyang Environmental Protection Technology Inc. (Huiyang Inc.)	22	24,800
Fujian Langqiankun Environmental Protection Technology Ltd. (Langqiankun Ltd.)	20	33,100
Nanchang Medical Waste Disposal Center Ltd. (Nanchang Ltd.)	17	41,100

Table S2. Details of major technologies of the IPC categories*.

Technical classification			Major IPC Subgroup	IPC definitions
Waste disposal	Collection and storage	Collection	B65F1/00	Refuse receptacles (containers not specially adapted for refuse, features of refuse receptacles of general interest B65D) [1, 2006.01]
			A61J1	Containers specially adapted for medical or pharmaceutical purposes (capsules or the like for oral use A61J 3/07; specially adapted for surgical or diagnostic appliances or instruments A61B 50/30; containers for radioactive substances G21F 5/00) [1, 4, 5, 2006.01]
			B02C4/00	Crushing or disintegrating by roller mills (with milling members in the form of rollers or balls co-operating with rings or discs B02C 15/00; roller mills or roll refiners exclusively for chocolate A23G 1/10, A23G 1/12) [1, 2006.01]
			B65D51/00	Closures not otherwise provided for (covers or similar closures as engineering elements for pressure vessels in general F16J 13/00) [1, 2006.01]
			B65D55/00	Accessories for container closures not otherwise provided for [1, 2006.01]
		Storage	G21F5/00	Transportable or portable shielded containers [1, 2006.01]
	Transfer and transport	Transfer and transport containers	B65D25/00	Details of other kinds or types of rigid or semi-rigid containers [1, 2006.01]
		Transfer and transport devices	B65G47/00	Article or material-handling devices associated with conveyors; Methods employing such devices [1, 2006.01]
	Pretreatment	Crushing	B02C18/00	Disintegrating by knives or other cutting or tearing members which chop material into fragments (slicing B26D); Mincing machines or similar apparatus using worms or the like (machines for domestic use not covered otherwise A47J 43/04; multi-purpose machines for preparing food A47J 44/00) [1, 2006.01]
			B02C4/00	Crushing or disintegrating by roller mills (with milling members in the form of rollers or balls co-operating with rings or discs B02C 15/00; roller mills or roll refiners exclusively for chocolate A23G 1/10, A23G 1/12) [1, 2006.01]
			B02C21/00	Disintegrating plant with or without drying of the material (for grain B02C 9/04) [1, 2006.01]
		Feeding/discharging	F23G5/00	Methods or apparatus, e.g. incinerators, specially adapted for combustion of waste or low-grade fuels [1, 4, 2006.01]
			B65F1/00	Refuse receptacles (containers not specially adapted for refuse, features of refuse receptacles of general interest B65D) [1, 2006.01]
			B65G5/00	Storing fluids in natural or artificial cavities or chambers in the earth [1, 2006.01]
	Disposal and recycling	Disposal	F23G5/00	Methods or apparatus, e.g. incinerators, specially adapted for combustion of waste or low-grade fuels [1, 4, 2006.01]
			F23G7/00	Methods or apparatus, e.g. incinerators, specially adapted for combustion of specific waste or low grade fuels, e.g. chemicals (F23G 1/00 takes precedence; incinerator closets A47K 11/02; oxidation of sludge C02F 11/06; incinerating radioactive waste G21F 9/00) [1, 4, 2006.01]
			A61L11/00	Disinfection or sterilising methods specially adapted for refuse [1, 2006.01]
			A61L2/00	Methods or apparatus for disinfecting or sterilising materials or objects other than foodstuffs or contact lenses; Accessories therefor (atomisers for disinfecting agents A61M; sterilisation of packages or package contents in association with packaging B65B 55/00; treatment of water, waste water, sewage or sludge C02F; disinfecting paper D21H 21/36; disinfecting devices for water closets E03D; articles having provision for disinfection, see the relevant subclasses for these articles, e.g. H04R 1/12) [3, 5, 7, 2006.01]
			C10B53/00	Destructive distillation, specially adapted for particular solid raw materials or solid raw materials in special form (wet carbonising of peat C10F) [1, 2006.01]
		Recycling	C10B53/00	Destructive distillation, specially adapted for particular solid raw materials or solid raw materials in special form (wet carbonising of peat C10F) [1, 2006.01]

* https://www.wipo.int/ipc/itos4ipc/ITSupport_and_download_area/20220101/pdf/scheme/full_ipc/en/index.html

		Movable disposal	C08J1/00	Recovery or working-up of waste materials (recovery of plastics B29B 17/00; polymerisation processes involving purification or recycling of waste polymers or their depolymerisation products C08B, C08C, C08F, C08G, C08H) [4, 2006.01]			
			C01G1/00	Methods of preparing compounds of metals not covered by subclasses C01B, C01C, C01D, C01F, in general (electrolytic production of inorganic compounds C25B 1/00) [1, 2, 2006.01]			
			C02F9/00	Multistep treatment of water, waste water or sewage [3, 2006.01]			
			B01D53/00	Separation of gases or vapours; Recovering vapours of volatile solvents from gases; Chemical or biological purification of waste gases, e.g. engine exhaust gases, smoke, fumes, flue gases or aerosols (recovery of volatile solvents by condensation B01D 5/00; sublimation B01D 7/00; cold traps, cold baffles B01D 8/00; separation of difficult-to-condense gases or air by liquefaction F25J 3/00) [1, 3, 5, 2006.01]			
			F23G7/00	Methods or apparatus, e.g. incinerators, specially adapted for combustion of specific waste or low grade fuels, e.g. chemicals (F23G 1/00 takes precedence; incinerator closets A47K 11/02; oxidation of sludge C02F 11/06; incinerating radioactive waste G21F 9/00) [1, 4, 2006.01]			
			Co-disposal	F23G5/00	Methods or apparatus, e.g. incinerators, specially adapted for combustion of waste or low-grade fuels [1, 4, 2006.01]		
				F23G1/00	Methods or apparatus specially adapted for cremation of human or animal carcasses [1, 2006.01]		
				F23G7/00	Methods or apparatus, e.g. incinerators, specially adapted for combustion of specific waste or low grade fuels, e.g. chemicals (F23G 1/00 takes precedence; incinerator closets A47K 11/02; oxidation of sludge C02F 11/06; incinerating radioactive waste G21F 9/00) [1, 4, 2006.01]		
			Pollution prevention and control	Flue gas purification	Flue gas purification in waste unincineration processes	B01D53/00	Separation of gases or vapours; Recovering vapours of volatile solvents from gases; Chemical or biological purification of waste gases, e.g. engine exhaust gases, smoke, fumes, flue gases or aerosols (recovery of volatile solvents by condensation B01D 5/00; sublimation B01D 7/00; cold traps, cold baffles B01D 8/00; separation of difficult-to-condense gases or air by liquefaction F25J 3/00) [1, 3, 5, 2006.01]
						B01D46/00	Filters or filtering processes specially modified for separating dispersed particles from gases or vapours (filtering elements B01D 24/00-B01D 35/00; filtering material B01D 39/00; their regeneration outside the filters B01D 41/00) [1, 2006.01, 2022.01]
Incineration flue gas purification	B01D53/00	Separation of gases or vapours; Recovering vapours of volatile solvents from gases; Chemical or biological purification of waste gases, e.g. engine exhaust gases, smoke, fumes, flue gases or aerosols (recovery of volatile solvents by condensation B01D 5/00; sublimation B01D 7/00; cold traps, cold baffles B01D 8/00; separation of difficult-to-condense gases or air by liquefaction F25J 3/00) [1, 3, 5, 2006.01]					
	Flue gas purification in sewage treatment	B01D53/00			Separation of gases or vapours; Recovering vapours of volatile solvents from gases; Chemical or biological purification of waste gases, e.g. engine exhaust gases, smoke, fumes, flue gases or aerosols (recovery of volatile solvents by condensation B01D 5/00; sublimation B01D 7/00; cold traps, cold baffles B01D 8/00; separation of difficult-to-condense gases or air by liquefaction F25J 3/00) [1, 3, 5, 2006.01]		
C02F1/00		Multistep treatment of water, waste water or sewage [3, 2006.01]					
G01N33/00	Investigating or analysing materials by specific methods not covered by groups G01N 1/00- G01N 31/00 [1, 2006.01]						
Wastewater and waste liquid treatment	Waste water treatment	C02F9/00		Multistep treatment of water, waste water or sewage [3, 2006.01]			
		Waste liquid treatment		C02F9/00	Multistep treatment of water, waste water or sewage [3, 2006.01]		
				C02F1/00	Treatment of water, waste water, or sewage (C02F 3/00-C02F 9/00 take precedence) [3, 2006.01]		
Waste management	Management in collection and transportation	Personal protective equipment		A41D13/00	Professional, industrial or sporting protective garments, e.g. surgeons' gowns or garments protecting against blows or punches (helmets A42B 3/00; clothing affording protection against chemical agents or for use at high altitudes A62B 17/00; life-saving garments for use at sea, diving suits B63C; bulletproof or armoured clothing F41H; clothing affording protection against radiation G21F 3/02) [1, 2006.01]		
	Management system	Automatic control	G05B19/00	Programme-control systems (specific applications, see the relevant places, e.g. A47L 15/46; clocks with attached or built-in means operating any device at a preselected time interval G04C 23/00; marking or sensing record carriers with digital information G06K; information storage G11; time or time-programme switches which automatically terminate their operation after the programme is completed H01H 43/00) [1, 2006.01]			

		I syste m	A61B5 0/00	Containers, covers, furniture or holders specially adapted for surgical or diagnostic appliances or instruments, e.g. sterile covers (drapes specially adapted for instruments A61B 46/10) [2016.01]
			B09B5 /00	Operations not covered by a single other subclass or by a single other group in this subclass [3, 2006.01]
			B65G1 7/00	Conveyors having an endless traction element, e.g. a chain, transmitting movement to a continuous or substantially-continuous load-carrying surface or to a series of individual load-carriers; Endless-chain conveyors in which the chains form the load-carrying surface [1, 2006.01]
			G01F2 3/00	Indicating or measuring liquid level or level of fluent solid material, e.g. indicating in terms of volume or indicating by means of an alarm [1, 2006.01, 2022.01]
			G01G1 9/00	Weighing apparatus or methods adapted for special purposes not provided for in groups G01G 11/00- G01G 17/00 [1, 2006.01]
			G01G2 3/00	Auxiliary devices for weighing apparatus [1, 2006.01]
	Evaluation method	Super vision and mana geme nt syste m	G06Q1 0/00	Administration; Management [2006.01, 2012.01]
		Speci al evalua tion metho d	G06Q5 0/00	Systems or methods specially adapted for specific business sectors, e.g. utilities or tourism (healthcare informatics G16H) [2006.01, 2012.01]