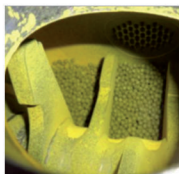




Industrial MechanoChemistry solid state synthesis

no solvents & no waste ☀ highly clean & highly green ☀ highly economic & CO₂-low



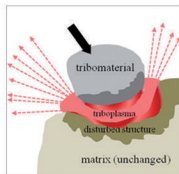
new structures and applications
through

Simoloyer®

at

High Kinetic Processing (HKP)

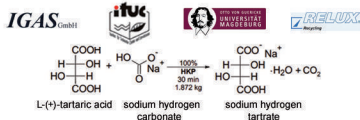
> 1.000 wasteless gas-solid / solid-solid reactions are reported across chemistry in sofar 26 reaction syntheses



Simoloyer® CM01-20m-s1, lab-scale

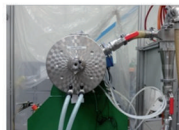


drug synthesis



DBU 29622-31 (2012) RESPEKT
EU-6FP 508714 (2005) REDLIP

EFRE pend. (2019) HBCDetox
DBU 33882-01 (2017) MechanoReSt



Simoloyer® CM20-20m, technical scale



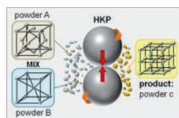
IP Polystyrene Recycling
Simoloyer® : H. Zoz, e. g. USP 5,464,163
Process : G. Luthé, ww pp 2018



IP Dioxine-Decontamination
G. Kaupp, H. Zoz, DE10261204/A1



Simoloyer® CM08 and CM20



[Industrial MechanoChemistry]

MechanoChemistry represents a mechanical powder processing route generating chemical reactions and phase transformations during high-energy/reactive milling (HEM/RM) concluded as High Kinetic Processing (HKP). Here, high kinetic energy impact can result in plastic deformation and chemical processes occurring almost simultaneously.



MechanoChemistry Simoloyer®	route / device	Conventional Chemistry e. g. stirring reactor
dry process, solvent-free	processing route	wet process and/or solvent-based
high - full	product yield	depending on reaction conditions
low - very low	contamination	product must be purified
easy scalable processing		
protective and/or vacuum atmosphere		
cryo- and/or heated process temperature		
easy to clean	cleaning	high efforts required

A unique example for mechanochemical reactions are stoichiometric reactions between materials forming a local surface plasma by spontaneous breakage of numerous metal-oxygen bonds. Such tribochemical reactions can be carried out in the Simoloyer® (Zoz HKP device).

Numerous novel materials synthesized on this route have already found applications e. g. as hydrogen storage materials, gas absorbers, food- and pharmaceutical additives and fine chemical synthesis.

Schedule & volumes	(a)	(b)	(c)
equipment scale Simoloyer®	CM100-MC	CM400-MC	CM900-MC
estimated	annual production [t]		
5-vanillylden barbituric acid (precursor)	50	200	446
sodium tartrate (food additive)	46	182	408
ureido-glucose (precursor for antibiotics)	64	254	567
full cost calculation, incl. raw materials, DE 2017	total cost / sales [€/kg]		
5-vanillylden barbituric acid (precursor)	272	268	267
sodium tartrate (food additive)	105	101	100
ureido-glucose (precursor for antibiotics)	48	45	45
included in full cost	investment		
set-up/start of new production/product line	10 months	16 months	20 months
total cost at partner Zoz [Mio€]	1.0	1.7	2.5
total cost at partner a, b [Mio€]	tbc	tbc	tbc