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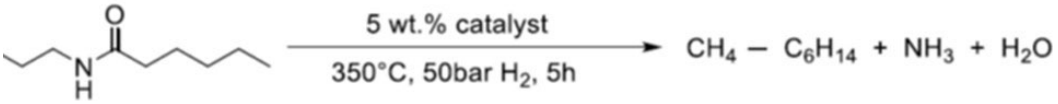
Licensing Opportunity

TTO – Technology Transfer Office

Converting N-containing polymers into hydrocarbon compounds



catalyst	conv. (%)	CH_4 (%)	C_2H_6 (%)	C_3H_8 (%)	C_4H_{10} (%)	C_5H_{12} (%)	C_6H_{14} (%)	others (%)
Pt/CeO_2	99	2	<1	<1	<1	7	**89**	–
Ru/CeO_2	100	**72**	27	1	–	–	–	–

Figure showing embodiments of the invention. Two different platinum group metals on a ceria carrier display different selectivity to N-hexylhexanamide as shown by the yield of recovered hydrocarbon compounds.

Ref. Nr

6.2351

Keywords

Nylon, poylamide, plastic, waste, catalytic hydrogenolysis, recycling

Intellectual Property

WO 2024/180224 A1

Publications

XinBang Wu et al, Controlling the selectivity of the hydrogenolysis of polyamides catalysed by ceria-supported metal nanoparticle Nature Communications, (2023) 14:6524

Date

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Description

Polyamide (PA) is an example of a nitrogen-containing polymer (plastic) that is widely used in applications as diverse as automobile, building and construction, electronics, textile and fishing industries. Catalytic hydrogenolysis has the potential to convert mixed plastic waste to valuable products and has been widely reported to cleave C-C bonds but has so far eluded C-N bonds cleavage.

The proposed method uses catalytic hydrogenolysis combining a reducing agent and transition metals supported on nanoparticle carriers acting as catalysts.

The method separates N-containing polymers into hydrocarbon and ammonia.

Advantages

The method is selective to C-N bonds and the catalyst can be easily recycled. The process is scalable and does not require any solvents.

The method can depolymerise pure PAs, PA blends, PA composites and real-world sources of waste PA.

The method allows to convert complex mixture into valuable products: hydrocarbon (alkanes) and ammonia.

Applications

- Plastic waste recycling of polyamides, polyurethanes, polyureas, polyamines, aminoplast resins, and copolymers or mixtures.
- Recycling of Polyamide based products such as Nylon.