

HEALTHIER CIGARETTES FOR HEATED TOBACCO PRODUCTS (HTPS)

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ABSTRACT

The *Pyrolysis and Polymer Processing* research group at the University of Alicante has developed a cigarette to be smoked in Heated Tobacco Products (HTPs) that emits less toxic products for the smoker. It is characterized because it allows a selective reduction of nicotine, it maintains the pleasant sensation of the conventional smoking process, and the manufacturing cost is very low.

We are looking for companies interested in acquiring this technology for commercial exploitation.



INTRODUCTION

Tobacco consumption has very important socio-economic implications.

On the one hand, it represents an important business for tobacco companies and it is an activity that generates a lot of jobs in the agricultural and industrial sectors.

On the other hand, the toxicity of tobacco smoke is directly related to many diseases, and its treatment represents a significant expense for public health.

Pressure from the authorities has led to a certain degree of awareness, and a lot of research is currently being carried out to reduce the toxicity of tobacco smoke, for example: development of new filters, improvement of the combustion of cigarette paper, genetic modification of tobacco, catalysts to reduce the toxicity of tobacco, and the development of alternative smoking articles, including: electronic cigarettes, devices to heat tobacco without burning it, etc.

In the recent years, **Heated Tobacco Products (HTPs)** are becoming increasingly important. These are devices that contain tobacco and produce nicotine sprays. HTPs allow imitation of the conventional cigarette smoking habit, however, unlike these, in HTPs, **tobacco is heated to a temperature between 250-350°C without producing combustion**, providing the smoker the possibility of enjoying tobacco without the need to burn significant amounts of it.

Therefore, the new HTPs provide smoker the benefits and advantages of conventional tobacco, while considerably reducing the emission of toxic products.

However, there is still a need to obtain cigarettes to be smoked in HTPs that emit less toxic products, while maintaining the pleasant sensation produced by conventional cigarettes.

TECHNICAL DESCRIPTION

The present invention solves the problems described above, since it provides **cigarettes to be smoked in Heated Tobacco Products (HTPs)** -also known as "heat-not-burn products"- which are characterized because they contain **specific catalysts** which

make it possible to selectively reduce the emission of toxic tobacco products.

In addition, these cigarettes maintain the sensations of pleasure produced by conventional products, and they have a low manufacturing cost.

This **new cigarette** is composed of:

1. Any type of **tobacco**:

- Conventional.
- Reconstituted.
- Expanded.
- Rolling.
- Pipe.
- Any mixture of the above.

2. At least, one **catalyst** -mix of them-, selected among:

- Mesoporous silicates (aluminosilicates):
 - * Type MCM-41.
 - * Type SBA-15.
- Zeolitic materials:
 - * ZSM-5.
 - * USY.
 - * HBeta.

3. Other **additives**, for example:

- Aromaticizers.
- Flavourings.
- Nicotine.

4. A cellulose acetate **filter**, with at least, one **membrane of impermeable material** -comprising up a total of 10 holes (of a certain diameter) uniformly distributed-. It may also contain an **additional membrane** consisting of an **adsorbent material**.

The catalysts above (Point 2.) may be mixed with the tobacco and/or in the adsorbent material of the additional filter membrane.

In studies with different materials, concentrations, heating temperatures and ways of mixing, the following **conclusions** have been made:

1. In all the materials tested were achieved more than 70% in **total reductions for nicotine, glycerine and nicotirin**. It has been shown that their effect is very significant.
2. All the catalysts used were **effective** when they used at high concentrations (SBA-15 and ZSM-5 produced important reductions, even at low concentrations).
3. In a very simple way, the reduction of toxic compounds can be regulated and made **selective respect to nicotine**.
4. The process of incorporating the catalyst does not significantly affect the results.
5. These materials are **very effective in reducing the toxicity of HTPs at temperatures of use** in these applications, achieving very significant reductions.
6. The **sensations** in the smoking process are **completely similar** to those produced by the **original tobacco**, appreciating a **softer flavor**, probably due to the reduction in the emission of toxic products.

ADVANTAGES AND INNOVATIVE ASPECTS

ADVANTAGES OF THE TECHNOLOGY

The new cigarettes to be smoked in Heated Tobacco Products (HTPs) are characterized because:

- 1) They emit **less toxic products for the smoker**, and therefore, it is reduced adverse effects of tobacco.
- 2) They allow a **selective reduction of nicotine**.

3) They maintain the **pleasant sensations** produced by conventional products.

4) They have **low manufacturing cost**.

INNOVATIVE ASPECTS OF THE TECHNOLOGY

This is the first time that **catalysts** have been incorporated in Heated Tobacco Products (HTPs), which means **exposing tobacco to temperatures** (250-350°C) **without producing combustion**, well below temperatures usually reached during the process of smoking conventional tobacco (800-900°C).

CURRENT STATE OF DEVELOPMENT

Experiments have been carried out with Marlboro (Philip Morris International) commercial HEET tobacco for iQOS devices. Experiments have also been carried out with the University of Kentucky's 3R4F reference tobacco, obtaining similar results.

In all the experiments carried out at **laboratory level**, **total reductions** in nicotine, glycerine and nicotirin of **more than 70%** have been achieved, thus demonstrating that they have a very significant favourable effect.

Cigarettes prepared with HEET **tobacco have been smoked by volunteers in iQOS devices**, having stated that the sensations are completely similar to those produced by the original HEET tobacco, appreciating a milder flavor. In any case, large-scale validation is required.

It can be concluded that the addition of these catalysts to tobacco (conventional, expanded, reconstituted or subjected to any manufacturing process), as well as to other (ligno)cellulosic materials (e.g.: paper or different alternative materials susceptible to be smoked in HTPs), allows to obtain very satisfactory results for the smoker, **inhaling a significantly lower amount of toxic compounds**, which is a further step in the possibility of having reduced risk products.

Prototypes are currently available for demonstration.

MARKET APPLICATIONS

This technology is part of the general field of **tobacco**.

In particular, it refers to a **cigarettes** to be smoked in **Heated Tobacco Products (HTPs)**.

COLLABORATION SOUGHT

We are looking for companies interested in acquiring this technology for **commercial exploitation** through **licensing agreements**.

Company profile sought:

- Tobacco companies.
- Tobacco filters manufacturers.
- Catalyst manufacturers.

INTELLECTUAL PROPERTY RIGHTS

The present invention is protected through **utility model application**:

- Title: "Catalizadores para reducir la toxicidad de los productos de tabaco para calentar (PTC)".
- Application number: U201932021.
- Application date: 11th December, 2019.

MARKET APPLICATION (3)

Materials and Nanotechnology
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