TECH OFFER

Next-Generation Smart Inhaler for Pulmonary Drug Delivery and Beyond

KEY INFORMATION

TECHNOLOGY CATEGORY:
Electronics - Sensors & Instrumentation
Healthcare - Medical Devices
Healthcare - Pharmaceuticals & Therapeutics
Healthcare - Telehealth, Medical Software & Imaging
Life Sciences - Industrial Biotech Methods & Processes

TECHNOLOGY READINESS LEVEL (TRL): TRL6
COUNTRY: HUNGARY
ID NUMBER: TO174868

OVERVIEW

Smart Inhalers pose great potential in empowering disease management. Common difficulties faced by patients in the use of inhalers include inaccurate dosing, incorrect inhalation technique, insufficient deep inspiration flow rate and compliance. This technology aims to tackle the issue of over or underdosage delivery, device misuse and lack of monitoring or analytics found in current technologies. Using its proprietary precision dosing system, the device can accurately control dosages with an error rate of as low as 4% while enabling intelligent therapy monitoring and medical reporting for improved patient adherence and treatments.

The device functions by breath-activated operation to prevent wastage, heat-free fine particle liquid nebulization for safer drug delivery and deeper lung deposition. It features a propellant-free compact (pocket-sized) smart inhaler with liquid drug cartridges

designed to replace injections and modernize inhaled therapies using the lung as a platform for delivery, addressing the lack of pain-free, hassle-free, smart alternatives for various medications. Due to its proprietary atomizer that works on almost 90% of most liquid medication, it has significant potential to be scaled in various drug types and markets, such as insulin, antivirals, hormones, and smart intranasal delivery for neurological conditions.

The technology owner is actively seeking collaboration opportunities with commercialization partners, pharmaceutical, biotech, OEM, CRO companies, who can license it to bring it to market or integrate it into existing healthcare systems. This scalability makes the technology highly appealing to a wide range of potential partners and licensees including co-development for customization and R&D or joint venture.

TECHNOLOGY FEATURES & SPECIFICATIONS

- **Proprietary precision dosing system**: Built-in circuitry that continuously monitors and controls consistent piezo's operation. Ensures accurate, stable, and quantifiable volume of liquids being atomized.
- **Deep penetration and targeting**: Patented technology engineers the piezo to stably operate around the optimal 2.5 microns for deep deposition into lungs. (Particles around 1 micron are exhaled because they are too light/small, particles above 4 microns are stuck in throat as they are too big/heavy).
- **Programmable**: Precision dosing can be controlled via device and phone by engineering a cut-off function so that device will not atomize when inhaled.
- **Customization**: Different formulations and multi-drug mixture in one pod or double cartridge delivery system.
- **Flexibility**: Options to deliver a wider range of medications, including micro-dosing (as low as 0.03ml/5secs) for more targeted and personalized treatment. Reducing the risk of adverse side effects and allowing for more effective treatment for sensitive patients.
- **Heat-free and propellant-free nebulization**: Does not affect medication degradation. Works with liquid medication (depends on viscosity of fluid).
- **Breath-activated suction cap**: Device does not have buttons.
- **Intelligent therapy monitoring**: The device automatically time stamps and captures each dose helping healthcare professionals track the progress of the therapy remotely.
- **Liquid disposable cartridge system**: Quick and hygienic medication replacement without the need for manual cleaning or maintenance of the inhaler. This reduces the risk of contamination or dosing errors.
- **Patient-designed convenience**: Non-removable rechargeable battery lasting up to one week before recharging. User friendly for patients to take their medication anytime and anywhere.

POTENTIAL APPLICATIONS

Industries where this technology can be deployed include:

- Pharmaceutical and biotechnology companies
- Medical device manufacturers
- Healthcare providers and clinics
- Digital health platforms and telemedicine services
- Diabetes care
- Value added generic medicine

Potential products based on this technology include:

- Broadening the arsenal of therapeutic options for the Health Care Providers
- New alternative to injections and current inhalation devices
- Smart intranasal delivery devices for neurological conditions and mental health treatments, increasing the potential for targeted drug delivery to the brain
- Integration with other health monitoring apps for better adherence and reporting (like continuous glucose monitors)
- Developing inhalable versions of pain-relief medications for patients who struggle with swallowing pills or require rapid onset of pain relief
- Smart inhalers for insulin delivery
- Faster and more efficient way to deliver antibiotics for respiratory infections, such as pneumonia or bronchitis, potentially reducing treatment duration and improving patient outcomes
- A more comfortable and less invasive method for administering vaccines, potentially increasing vaccination rates and improving public health
- Developing targeted inhalable chemotherapy or immunotherapy treatments for lung cancer or other respiratory-related malignancies, potentially reducing systemic side effects and increasing treatment efficacy

MARKET TRENDS & OPPORTUNITIES

The approximate market size for this smart inhaler technology can be substantial, given its potential applicability across various therapeutic areas. The global inhaler market was valued at around US$39.3 Billion in 2022 while the diabetes management market US$92.97 Billion. Considering the smart inhaler's ability to address both the pulmonary drug delivery and daily injection markets, the Total Available Market can be up to a US$1 Trillion adding up all the therapeutic areas.

UNIQUE VALUE PROPOSITION

This proprietary smart inhaler technology represents a significant improvement over the current "State-of-the-Art" in drug delivery systems. Its unique value lies in its combination of precision dosing, versatility, and improved patient experience.

Benefits for healthcare professionals and patients include:

- Ensuring accurate dose administration, driving therapy effectiveness
- Greater therapy monitoring and personalized care
- Differentiating drug offerings and broadening therapeutic options for healthcare providers
- Simplifying drug delivery, increasing patient satisfaction
- Intelligent therapy monitoring and medical reporting features leads to enhanced patient experience

Health-economic benefits:

- Reducing waste and optimizing resource utilization
- Enhancing adherence, leading to better health outcomes and reduced healthcare costs
- Expanding the reach of insulin therapy to more people, addressing unmet needs
- Potential cost savings for payers
- Pricing flexibility that accounts for the benefits of the new application

Benefits for partners:

- By maximizing drug portfolio potential, this technology allows pharmaceutical companies to diversify, differentiate, and

defend against patent expiration, leading to improved patient outcomes and market growth