

Oral Microsensor Arrays for Remote Monitoring of Salivary Electrolytes for Precision Healthcare

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SUMMARY

UCLA researchers in the Department of Oral & Maxillofacial Surgery have developed a novel microsensor system for unobtrusive monitoring of oral pH and electrolytes levels. This system is integrated into a data analysis and feedback network for disease prevention and precision care.

BACKGROUND

High salt content in diets can aggravate many diseases, such as high blood pressure, heart failures and kidney diseases. According to the WHO and American Heart Association, individual and population-level monitoring should take place to evaluate the problem and implement dietary interventions. The current gold-standard methods of salt intake monitoring include 24-hour urine collection, spot urine collection, and dietary assessment. The results of these approaches are often inaccurate and do not reflect salt intake trends over time. This makes salivary electrolyte monitoring an attractive alternative.

INNOVATION

This microsensor system is an integrated network composed of a miniature electrochemical microsensor, a smart toothbrush for data collection and power supply, and a remote analysis and feedback system (ROHAS) for personal health monitoring and disease prevention. The microsensor is an RFID-based sensing system bonded to a molar tooth, which conditionally activates during chewing and dynamically measures sodium and potassium levels in the saliva. The toothbrush handle contains a reader that retrieves the measurement data, which is then transmitted to a central cloud server for analysis and monitoring via a smartphone. The toothbrush head is a near field charger that replenishes power supply for the molar bonded microsensor. This solution leads to long-term, unobtrusive and dynamic monitoring of dietary sodium and potassium intake that provides paramount insights into dietary electrolyte effects on disease prevention and progression.

APPLICATIONS

Dietary sodium and potassium level monitoring for prevention and care of:

- ▶ Heart disease
- ▶ Kidney disease
- ▶ Oral disease
- ▶ High blood pressure

Population studies of dietary electrolytes intake

Personal dietary electrolytes intake intervention

ADVANTAGES

- ▶ Integrated into complementary data collection and feedback ecosystem (ROHAS)
- ▶ Integrated network feedback provides personalized care
- ▶ Long term and dynamic monitoring
- ▶ Not resource intensive
- ▶ Unobtrusive
- ▶ Accurate
- ▶ Easy to use at home

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OTHER INFORMATION

KEYWORDS

Electrochemical sensor, RFID,
Precision Health, Microfabrication,
Machine learning

CATEGORIZED AS

- ▶ **Biotechnology**
 - ▶ Health
- ▶ **Medical**
 - ▶ Devices
 - ▶ Disease: Cardiovascular and Circulatory System
 - ▶ Disease: Dental
 - ▶ Disease: Kidneys and Genito-Urinary System
- ▶ **Sensors & Instrumentation**
 - ▶ Biosensors
 - ▶ Medical

RELATED CASES

2017-854-0

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Published Application	20220031250	02/03/2022	2017-854

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