

# 마이크로 리드스위치를 이용한 능동캡슐내시경 생검장치 구동메커니즘

## Triggering Mechanism Using Micro Reed Switch for Biopsy Device of Active Capsule Endoscope

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### 1. Introduction

Limitations of current wireless capsule endoscope is the inability to have flexible motion to access miniature conduits or the whole gastrointestinal (GI) tract, and extracting biopsy tissue from small intestine. The need motivates a breakthrough for a wireless active locomotive capsule endoscope investigating and taking biopsy with in GI tract.

### 2. Main Subject

This paper proposed an active locomotive intestinal capsule endoscope (ALICE) having active investigation ability in GI tract integrating with novel micro-biopsy tool to extract the biopsy tissue from small intestine. The ALICE has ability of target random biopsies by localization method, coming to right place to take biopsy sample. The biopsy mechanism provides active triggered mechanism with highly positional accuracy to collect the biopsy tissue sample for clinical doctor to analyze. Furthermore, biopsy module can work with limited energy of capsule endoscope.

### 3. Conclusion

A prototype of capsule endoscope ALICE integrating with smart-triggered biopsy module was built, as presented in Fig. 1(a). The ALICE was driven to do flexible investigation and approach random biopsy target by controlling electromagnetic actuation system (EMA) in the medium level of magnetic field intensity. After coming to target lesion, by increasing the magnetic field to high level the capsule is attached harder to intestinal wall and Reed switch is closed to trigger the biopsy process, as shown in Fig.1(b). The EMA system can both manipulate the motion of ALICE and trigger biopsy module. The biopsy module with small dimension of

5.5mm in length can solve effectively the problem of reaction force against intestinal wall, with small amount of consumed energy, up to 4% of total. In addition, the proposed biopsy device can also be integrated into other conventional CEs without changing their telemetry module and can be triggered by external permanent magnet, this opens a potential revolution for an era of biopsy capsule endoscope technology.

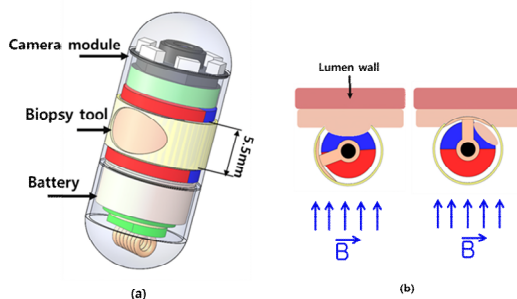


Fig. 1.(a) Schematic of proposed active locomotive intestinal capsule endoscope, (b) biopsy sample extracting mechanism

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