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香港城市大學
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A Test Rig to Evaluate the Cutting Performance and Non-stickiness of Electrosurgical Blades

Health & Wellness

Testing Instruments

Opportunity

There are many advantages of using electrosurgical blades in surgery, less time, accelerating and optimizing treatments, decreases bleeding to name a few. However, the temperature at the contact point of the blade can be up to 300°C causing eschar to be built easily. This causes adhesion of the tissue to the blade, increased electrical resistance, reduced surgical effect, and can serve as a fuel source leading to surgical fires. Apart from high wear resistance, the electrosurgical blade should have good non-stickiness. Currently there is no objective consistent way of measuring these parameters. In this invention, a test rig is developed to monitor the resisting force acting on the test specimen in electrosurgical cutting. The test rig is able to provide controllable cutting conditions for testing a specific cutting process. The data acquired will improve the understanding of the cutting behavior of the electrosurgical blades in more details and help in designing suitable surface treatments to improve the cutting performance and non-stickiness of electrosurgical blades.

IP Status
Patent granted

Technology Readiness Level (TRL) 4

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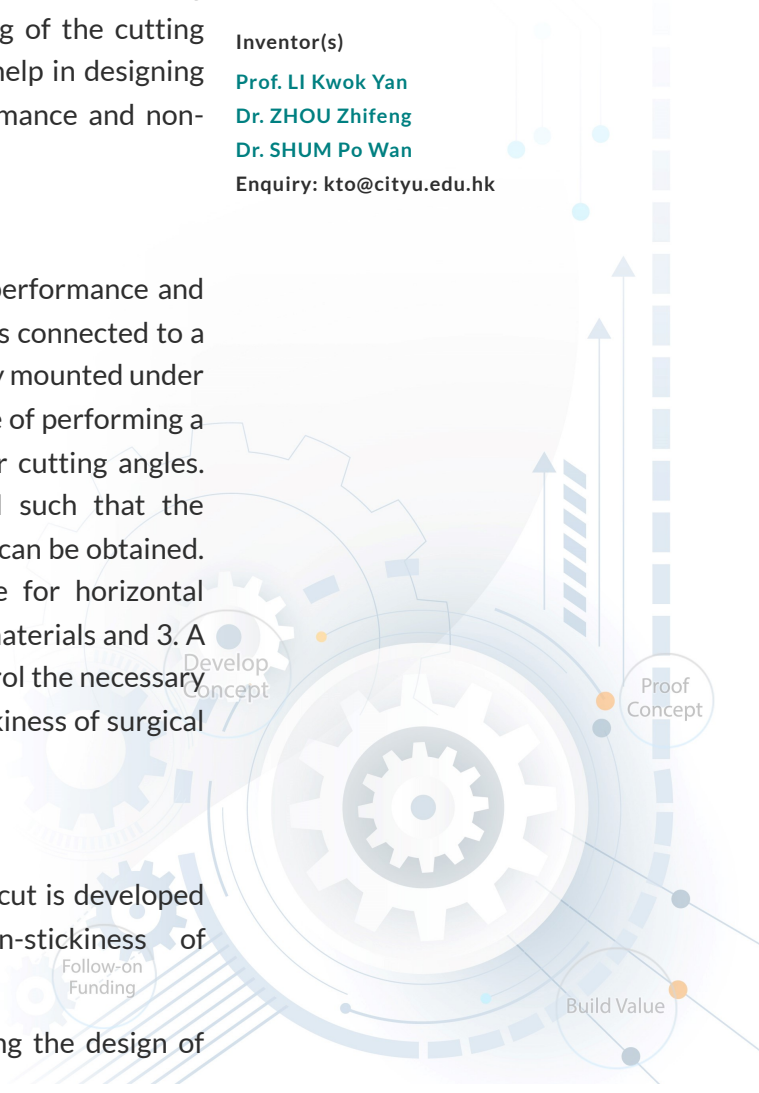
Technology

This invention describes a test rig to evaluate the cutting performance and non-stickiness of electrosurgical blades. The surgical blade is connected to a high radio frequency generator. The cutting medium is rigidly mounted under some form of tensioning. Once aligned the test rig is capable of performing a preset cutting along a single plane, with varying speeds or cutting angles. Resisting forces is detected with an accuracy of 1 mN such that the penetration profile (resisting force against cutting distance) can be obtained.

The test rig has three functional modules: 1. a module for horizontal movement, 2. a module for clamp designed to hold testing materials and 3. A module to hold the cutting blade. These three modules control the necessary functions to evaluate the cutting performance and non-stickiness of surgical blades.

Advantages

- Eliminate subjectivity on testing by human. Controllable cut is developed for evaluting the cutting performance and non-stickiness of electrosurgical blades.
- Detail cutting profiles can be obtained for analysis aiding the design of blade improvement.



Applications

- Study of the penetration profile information for analyzing the cutting performance of each blade. The resisting force in the profile can indicate the resistance from the material during cutting. The level of the resisting force can indicate the cutting efficiency of a cutting process/blade. Low resisting force indicates the good cutting efficiency or good non-stickiness of a cutting process/blade.
- Evaluation of non-stickiness of surgical blades. By conducting a controllable cut (same cutting speed and cutting depth) on a test material, the adhered materials are measured by a digital weight balance. The weight gain represents the sticking behavior of the sample. Smaller weight gain indicates a surface with a better non-stickiness. In addition, optical microscopy can be used to identify the material sticking to the surface of the blades.