Pulse Modulation with Moses Technology Improves Popcorn Laser Lithotripsy

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CONFLICT OF INTEREST DISCLOSURE

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INTRODUCTION

Most effective pulse duration for creating sub-millimeter fragments for high power popcorn lithotripsy:

SHORT PULSE (SP) vs LONG PULSE (LP) = SHORT PULSE (SP)

KNOWN

SHORT PULSE (SP) vs MOSES TECHNOLOGY = 

UNKNOWN

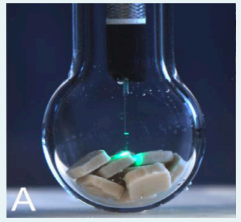
PRIMARY OUTCOMES

Compared Moses Distance mode vs SP

Fragment Size Distribution	Mass Loss in Fluid	Laser-to-stone Strike Rate

MATERIALS AND METHODS

1. 10 (3x3x1mm) pre-hydrated BegoStones (15:3) in a 11 mm glass test tube **(Figure A)**. Experiments were recorded at 10,000 FPS (frames per second) by positioning a high-speed camera in front of the model **(Figure B)**.



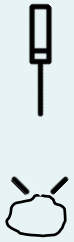
2. 20W and 40W settings tested: 20W (1Jx20 Hz; 0.5Jx40 Hz) 40W (1Jx40 Hz; 0.5Jx80 Hz)

3. Stone weight was recorded pre- and post-experiment. Fragment size distribution was determined using micro sieves (0.25, 0.5, 1.0, and 2.0 mm).

4. Strikes were calculated (# of laser strikes occurring in 1s /setting frequency) then categorized as:

DIRECT

A visual plume of dust ejected from stone while in contact with the fiber-tip



INDIRECT

A visual plume of dust ejected from stone with distance between stone and fiber-tip

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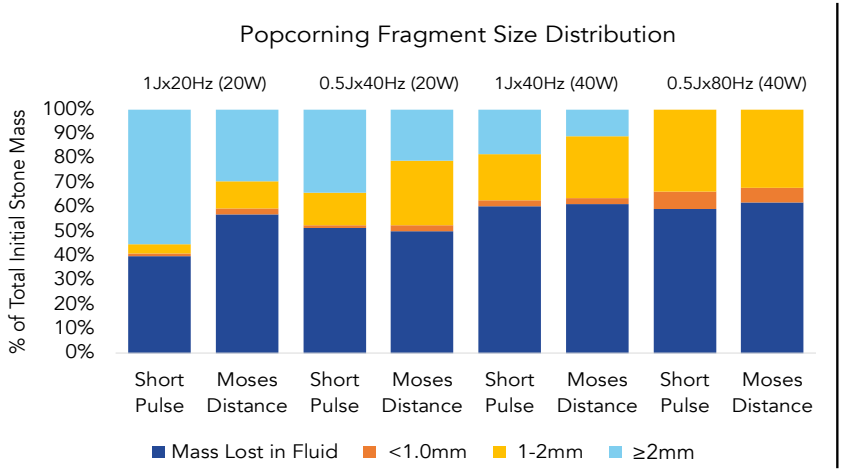
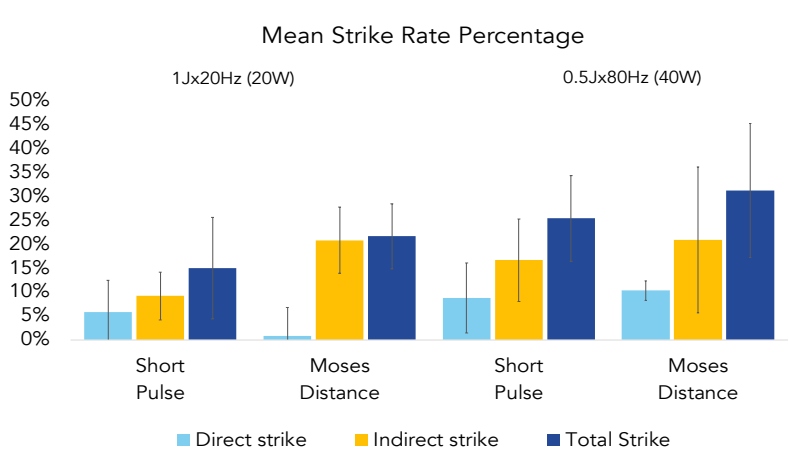
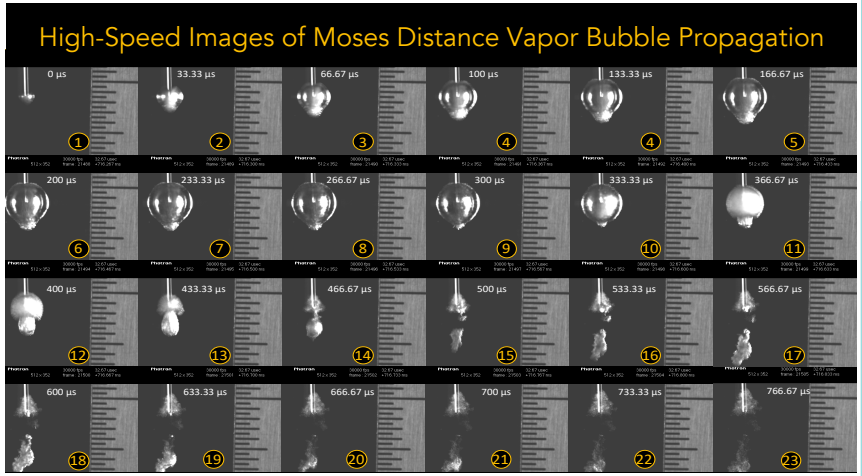
RESULTS







CONCLUSIONS

1. Fragment Distribution — MOSES TECHNOLOGY > SHORT PULSE (SP)
2. For 1Jx20Hz, Mass Lost in Fluid — MOSES TECHNOLOGY > SHORT PULSE (SP)
3. Laser-to-stone Indirect Strike Rate — MOSES TECHNOLOGY > SHORT PULSE (SP)

IMPLICATIONS

(20 W)
MD 1x20Hz

- ✓ Limiting heat generation
- ✓ Improving visualization
- ✓ Preventing fiber tip-degradation

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