
CAUTION!
1. Move mixing basket by pulling red and black knobs (balls) toward you. Do NOT touch blue parts.
2. Rotate mixing basket forward by pulling knobs until it engages the locked, secure position.
3. Only remove mixing vessel once system is locked.
4. Read OPERATING INSTRUCTIONS.
GLEN MILLS INC. 973-777-0777

1
00:00:07,760 --> 00:00:05,230
[Music]

2
00:00:09,650 --> 00:00:07,770
hi I'm Marvin Barnes and I'm the

3
00:00:15,350 --> 00:00:09,660
principal investigator for this SIF

4
00:00:17,150 --> 00:00:15,360
project together we're developing

5
00:00:20,150 --> 00:00:17,160
nuclear fuel for nuclear rocket engines

6
00:00:23,090 --> 00:00:20,160
in FY 18 we were awarded center

7
00:00:25,910 --> 00:00:23,100
innovation funding to fabricate test and

8
00:00:27,080 --> 00:00:25,920
characterize nuclear fuel samples this

9
00:00:28,400 --> 00:00:27,090
work is being performed as a

10
00:00:30,380 --> 00:00:28,410
collaboration with the University of

11
00:00:32,630 --> 00:00:30,390
Tennessee where advanced

12
00:00:34,880 --> 00:00:32,640
characterization is taking place in

13
00:00:37,220 --> 00:00:34,890

house we're doing the fabrication and

14
00:00:38,720 --> 00:00:37,230
the testing of these fuel materials my

15
00:00:40,520 --> 00:00:38,730
name is taylor Duffin I'm a graduate

16
00:00:42,740 --> 00:00:40,530
student from University of Tennessee in

17
00:00:45,529 --> 00:00:42,750
Knoxville our sip project supports

18
00:00:48,200 --> 00:00:45,539
nuclear thermal propulsion NTP is an

19
00:00:51,290 --> 00:00:48,210
in-space propulsion technology which is

20
00:00:54,470 --> 00:00:51,300
useful for supporting crewed missions

21
00:00:56,630 --> 00:00:54,480
beyond low-earth orbit to Mars if we use

22
00:00:59,209 --> 00:00:56,640
NTP we can reduce our travel times and

23
00:01:01,340 --> 00:00:59,219
harmful effects to our astronauts the

24
00:01:04,009 --> 00:01:01,350
fuel for NTP is one of the major

25
00:01:06,170 --> 00:01:04,019
limiting factors in this SIF we're

26
00:01:08,359 --> 00:01:06,180
developing a molybdenum sermon or

27
00:01:10,880 --> 00:01:08,369
ceramic metallic fuels as an alternative

28
00:01:12,649 --> 00:01:10,890
to tungsten these molybdenum fuels will

29
00:01:14,600 --> 00:01:12,659
be more affordable than tungsten based

30
00:01:17,330 --> 00:01:14,610
one the main objective for this project

31
00:01:19,010 --> 00:01:17,340
is to identify the maximum use

32
00:01:20,960 --> 00:01:19,020
temperature for molybdenum sarmento

33
00:01:22,910 --> 00:01:20,970
fuels in both thermal cycling and

34
00:01:24,620 --> 00:01:22,920
steady-state conditions in the

35
00:01:28,340 --> 00:01:24,630
molybdenum Cir matte powder blending

36
00:01:30,580 --> 00:01:28,350
process we have molybdenum ceramic fuel

37
00:01:33,499 --> 00:01:30,590
element and the binder mixed together

38
00:01:36,560 --> 00:01:33,509

and the binder is there to hold

39
00:01:39,020 --> 00:01:36,570
everything together nicely then they are

40
00:01:41,480 --> 00:01:39,030
mixed in the turbulent heated and

41
00:01:46,130 --> 00:01:41,490
stirred to produce an even coating this

42
00:01:48,020 --> 00:01:46,140
allows for optimal fuel performance we

43
00:01:51,710 --> 00:01:48,030
turn our powders into solid samples

44
00:01:53,569 --> 00:01:51,720
using spark plasma sintering we are

45
00:01:56,120 --> 00:01:53,579
optimizing time temperature and pressure

46
00:01:59,660 --> 00:01:56,130
to make fully dense samples with the

47
00:02:02,030 --> 00:01:59,670
best micro structures we perform high

48
00:02:04,850 --> 00:02:02,040
temperature testing on our samples in C

49
00:02:06,830 --> 00:02:04,860
feet up to 2500 Kelvin and low flowing

50
00:02:09,499 --> 00:02:06,840
hydrogen to simulate the conditions in

51
00:02:11,240 --> 00:02:09,509
the nuclear rocket engine we observe the

52
00:02:13,050 --> 00:02:11,250
mass loss to the sample and then

53
00:02:15,120 --> 00:02:13,060
characterize the

54
00:02:17,910 --> 00:02:15,130
Appl microstrain jizz that have occurred

55
00:02:20,070 --> 00:02:17,920
by advanced microscopy through this

56
00:02:22,260 --> 00:02:20,080
project we are able to produce high

57
00:02:25,140 --> 00:02:22,270
density molybdenum sermonette fuels with

58
00:02:27,170 --> 00:02:25,150
desirable micro structures we will be

59
00:02:30,150 --> 00:02:27,180
recommending maximum use temperatures

60
00:02:32,280 --> 00:02:30,160
derived from testing data thank you for

61
00:02:34,020 --> 00:02:32,290
the funding we hope that the technology

62
00:02:36,660 --> 00:02:34,030
developed through the SIF project will