



1
00:00:00,000 --> 00:00:03,470
(Roar of rockets slowing rover's descent)

2
00:00:03,490 --> 00:00:07,160
Narrator: When NASA's Mars Science Laboratory lands in a region known as Gale Crater

3
00:00:07,180 --> 00:00:12,630
in August of 2012, it will be poised to carry out the most sophisticated chemical analysis

4
00:00:12,650 --> 00:00:14,680
of the Martian surface to date.

5
00:00:14,700 --> 00:00:19,300
The minerals on Mars may reveal a chemical record of past and present environments,

6
00:00:19,320 --> 00:00:22,960
but the right tools are required to read this record.

7
00:00:22,980 --> 00:00:25,960
One of the 10 instruments on board the rover Curiosity

8
00:00:25,980 --> 00:00:29,680
will be CheMin - short for chemistry and mineralogy.

9
00:00:29,700 --> 00:00:34,640
Developed by Ames researcher David Blake and his team, it will use new technology

10
00:00:34,660 --> 00:00:38,680
to analyze and identify minerals in the Martian rocks and soil.

11
00:00:38,700 --> 00:00:41,580
David Blake: The measurement we're making is called Powder X-Ray Diffraction

12
00:00:41,600 --> 00:00:47,460
and it requires a powdered material and quite often, it's very difficult or impossible

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00:00:47,480 --> 00:00:52,260

to powder a material finely enough to get a good pattern.

14

00:00:52,280 --> 00:00:58,390

We developed a method for shaking the grains at sonic frequencies that allows the grains

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00:00:58,410 --> 00:01:01,470

to actually flow like a liquid through the beam.

16

00:01:01,490 --> 00:01:07,630

And when this is done, all the crystals, as they go through the beam in random orientations,

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00:01:07,650 --> 00:01:14,170

even though they are coarse-grained, have the appearance to the beam of being a fine-grained powder.

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00:01:14,190 --> 00:01:18,140

Narrator: An x-ray beam no larger than a human hair will fire into the sample,

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00:01:18,160 --> 00:01:22,460

causing the beam to scatter and also fluoresce the sample particles.

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00:01:22,480 --> 00:01:28,400

A CCD sensor will capture the information so that it can be relayed to scientists back on Earth.

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00:01:28,420 --> 00:01:33,960

David Blake: For planetary exploration, rather than trying to get a sample and bring it back to Earth,

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00:01:33,980 --> 00:01:40,390

which is a very expensive and complicated procedure, we can now do laboratory quality analyses

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00:01:40,410 --> 00:01:44,130

on the planet surface, in real-time.

24

00:01:44,150 --> 00:01:48,000

Narrator: Different minerals are linked to certain kinds of environments.

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00:01:48,020 --> 00:01:51,750

For example, some form with lava, some form with water.

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00:01:51,770 --> 00:01:57,240

Scientists will use CheMin to search for mineral clues indicative of a past Martian environment

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00:01:57,260 --> 00:01:59,280

that might have supported life.

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00:01:59,300 --> 00:02:03,060

What makes it possible for Curiosity to carry this CheMin instrument

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00:02:03,080 --> 00:02:07,060

is over 20 years of development by David Blake and his team.

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00:02:07,080 --> 00:02:10,200

A device that once was the size of a double refrigerator

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00:02:10,220 --> 00:02:13,370

has now been reduced to about the size of a briefcase.

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00:02:13,390 --> 00:02:18,740

Variations of the instruments have been adapted for field work in geology, transportation security

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00:02:18,760 --> 00:02:22,250

and analysis of art and antiquities.