



NEWS

24/04/2016

GRS Alert: Unusual phosphorescent pebbles identified as synthetic aggregates

Phosphorescent pebbles are presented in the market as natural rounded pebbles (3.53 density) possessing extraordinary properties such as green phosphorescence when exposed to a strong light source and patchy blue to green fluorescence in short- and long wave UV-light (Figure 1), again with green phosphorescence (no blue).



Figure 1: Synthetic aggregate pebble of over 930 ct exposed to long wave UV-light (365nm) exhibiting patchy blue to green fluorescence. Photo Warren Serrie / © GRS Gemresearch Swisslab AG.

Such items appeared multiple times in the last two years at our laboratories (see explanatory movie clip). They are sold at very high prices of thousands of US dollars per piece or sometimes even per carat. The first specimen we have tested initially appeared in Burma (Myanmar) in 2014. Similar material appeared as carvings on the Chinese market according to an article published on the website of the Gems & Jewelry Trade Association of China.

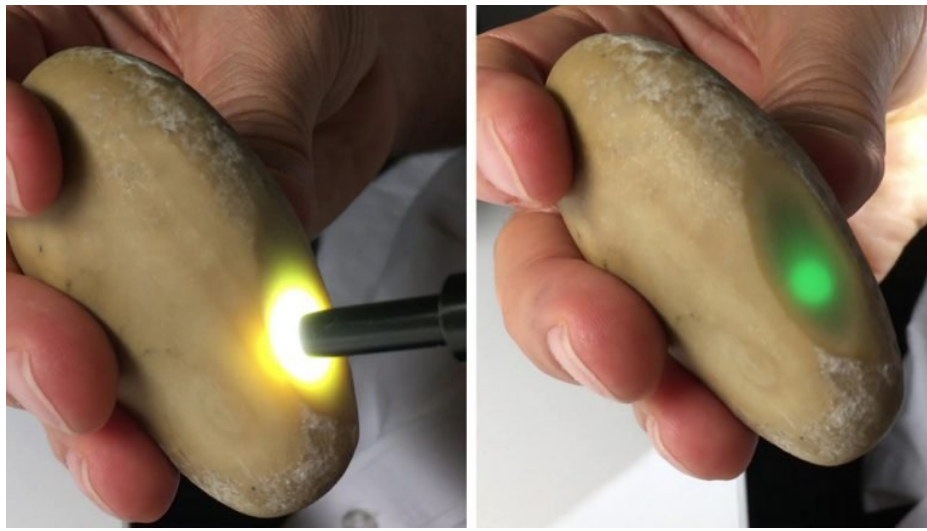


Figure 2: Polished surface of synthetic aggregate showing strong green phosphorescence after exposure to strong light source. Photo: A. Peretti, © GRS Gemresearch Swisslab AG.

Initially, we thought this is an erratic problem within the industry and not worth alerting the public about. But since this type of material continued to reappear at our laboratory, we believe it is necessary to alert the public with an official GRS Alert. Our research indicated that the synthetic material had been purposely tumbled and aged through a chemical alteration process with the intention of mimicking a naturally weathered product (Figure 3).



Figure 3: Tumbled and chemically altered surface of synthetic aggregate. Photo: A. Peretti, © GRS Gemresearch Swisslab AG.

We had the material analyzed by XRD through the University of Bern, Switzerland by Prof. Thomas Armbruster to identify it structurally, then measured it using ED-XRF analysis at our GRS laboratory for chemical composition.

Results

The analyses showed that this material is a synthesized aggregate material (Fig. 4). The material was first synthesized in Russia in 1976 as $\text{Sr}_4\text{Al}_4\text{O}_{25}$ and published by Nadezzhina (1976), *Kristallografiya*, 21, 826. The literature from Chinese researchers (Chengkang et al. 2006) confirmed that this type of material was later doped with Europium (Eu) on Strontium (Sr) position, which creates phosphorescence.

Detailed XRD analyses revealed that the material we had tested also contained a minor secondary synthetic phase of SrAl_2O_4 in addition to the material mentioned above, actually identifying the pebbles as an aggregate of two structurally different synthetic substances. Additional ED-XRF analyses confirmed the elements Strontium (Sr) and Aluminum (Al) but showed that instead of Europium (Eu), the major REE element was Dysprosium (Dy).

No traces of radioactivity were found when tested with a Geiger counter.



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GEMSTONE REPORT
EDELSTEINBERICHT
RAPPORT DE PIERRE PRÉCIEUSE

No. 2016-Sample
Date 21st April 2016
Object One rough item
Identification Synthetic Aggregate ($\text{Sr}_4\text{Al}_{14}\text{O}_{23}$ and SrAl_2O_3)*

GRS

Weight 930.42 ct
Dimensions 72.6 x 45.9 x 29.4 (mm)
Cut rough
Shape oval
Color brownish yellow-green with green phosphorescence when exposed to intense light
*Rare earth element doped

Dieser Edelsteinbericht wird nur unter der Voraussetzung abgegeben, dass die wichtigsten Informationen auf der Rückseite als Vertragsbestandteil mit der GRS Gemresearch Swisslab AG akzeptiert worden sind. Spezielle Beachtung ist der Handhabung mit der Deklaration von Behauptungen zu schenken.

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Figure 4: GRS report of synthetic aggregate pebble of 930 ct. © GRS Gemresearch Swisslab AG.

Explanatory Video

Literature

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