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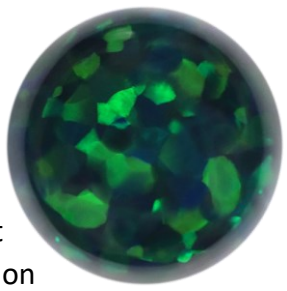
Gemmology Bulletin

Artificial Opals

By James Evans, EG

The artificial opals in today's marketplace provide a dazzling display of iridescence!

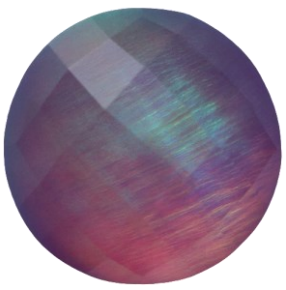
Coarse-crystalline Non-directional Opal



Produced by *Pinfire Gems & Colloids*, these were the first homogeneously crystallised imitation opals (meaning they can be cut in any direction).

The material shows an intense play-of-colour in an irregular, polygonal pattern (which includes the hexagons and squares associated with body-centred cubic growth). The play-of-colour can be produced in any shade, by changing either the size of the constituent silica nanoparticles or the spacing between the particles.

Aurora Opal

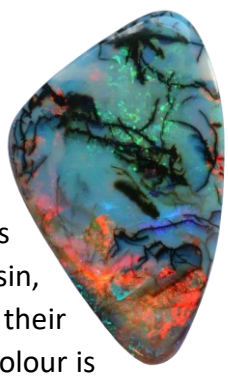


Aurora Opal is a fine-crystalline version of Pinfire's non-directional opal, which displays a 'swirly' or 'flame-like' play-of-colour.

These gems can be distinguished from their natural counterparts by their warmer touch. Both coarse- and fine-crystalline versions are composed of around 20% silica, which forms colloidal crystals within a resin monomer (that is later polymerised).

The specimen shown is a doublet consisting of an Aurora Opal base and a faceted glass top.

Sterling Opal



Sterling Opal was created by James Zachary and brought to market in 2012.

The material is characterised by dark veins (akin to potch). It is stabilised with resin, though cut gems will feel cold due to their high silica content. The gem's play-of-colour is limited to orange, green and violet, with patterns ranging from a platy iridescence (reminiscent of ammolite), to an ethereal glow only otherwise seen in natural opal.

Sterling Opal shows a chalky white iridescence in LW UV light and is orange to red in transmitted light.

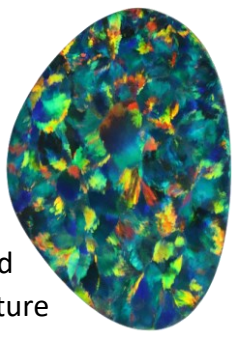
Slocum Stone

Developed by John Slocum, this artificial opal entered the market in 1974.

Slocum Stone is a silicate glass with the appearance of embedded metallic films (though the effect may be structural rather than compositional). The 'films' may appear pockmarked, broken, or show 'epidermal' breaks (like the cell-structure of onion skin). In transmitted light, they display a different set of (interference) colours.

This specimen also shows a wavering red adularescence, due to an additional 'film' covering the entire stone.

Gilson Opal



Shortly after the silica structure of opal was determined, Pierre Gilson started work to manufacture the material. His results were first reported by Richard Liddicoat in 1972 and described as having a 'harlequin type' play-of-colour.

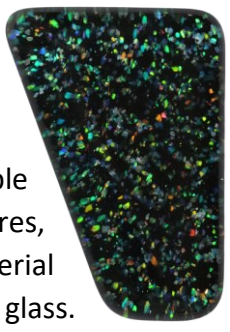
This specimen is a doublet of Gilson Opal upon a natural Rhyolite base.

Kyocera Opal

Gilson's method was soon modified: first by replacing the silica with styrene and stabilising the material with resin; then by stabilising silica with resin.

All such material has a columnar structure. Viewing it down through the columns will reveal either a 'lizard-skin' pattern or else 'crenulated' crystal boundaries.

Crushed Opal



Gilson Opal is stable to high temperatures, allowing the material to be set in molten glass.

This specimen consists of crushed opal sandwiched between layers of dark and clear borosilicate glass. The material contains numerous bubbles, and a composite structure that is clearly visible from the side.

Mylar in Resin

Mylar is a generic name for polyester film. When coated with a layer of metal and set within a second resin, flakes of mylar produce 'thin-film interference' which mimics the play-of-colour of precious opal (though not particularly well).

Dragon's Breath Glass

Originally known as 'Mexican Opal', this gem material displays a wavering purple (or occasionally white) adularescence.

The glass was first produced in Bohemia in the early 20th century.

Foil in Glass

Perhaps the least convincing of all artificial opals, these gems were mass-produced in the mid-20th century and typically set in Victorian style brooches.

With thanks to David J. Lilly for donating the Coarse-crystalline Non-directional Opal.

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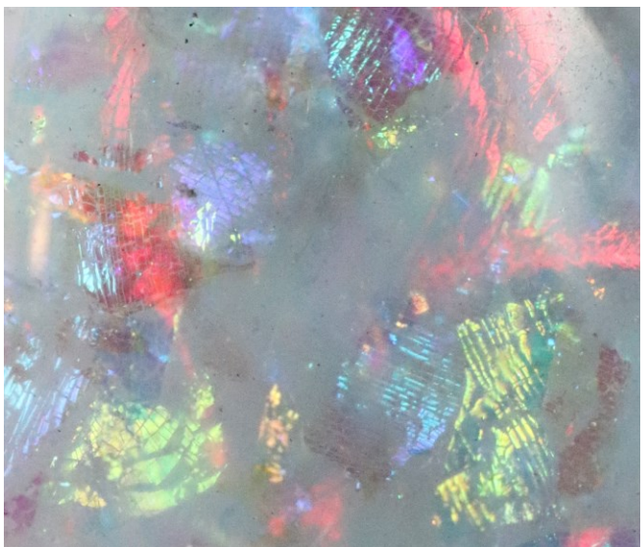
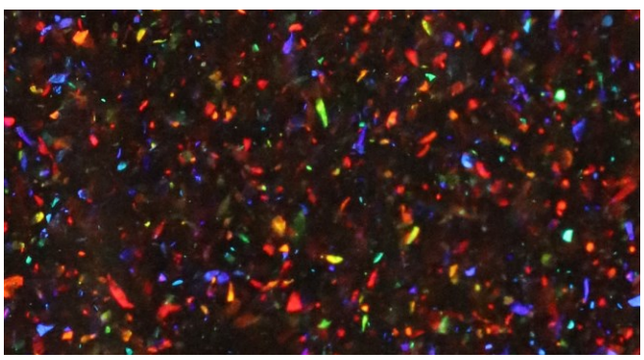
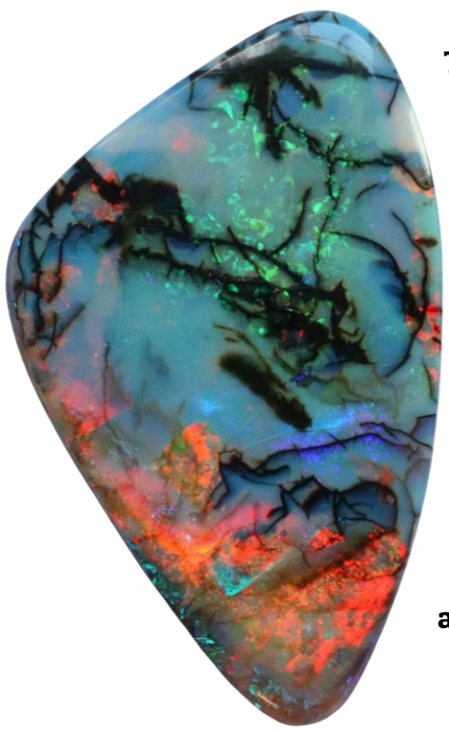
Identifying Artificial Opals

Identifying artificial opal relies on careful examination. The greatest challenge presented by these stones comes from either Slocum Stone that displays a pinfire play-of-colour, or else light Sterling Opal that contains none of the material's characteristic black veining. In both cases, identification is made considerably easier with transmitted light.

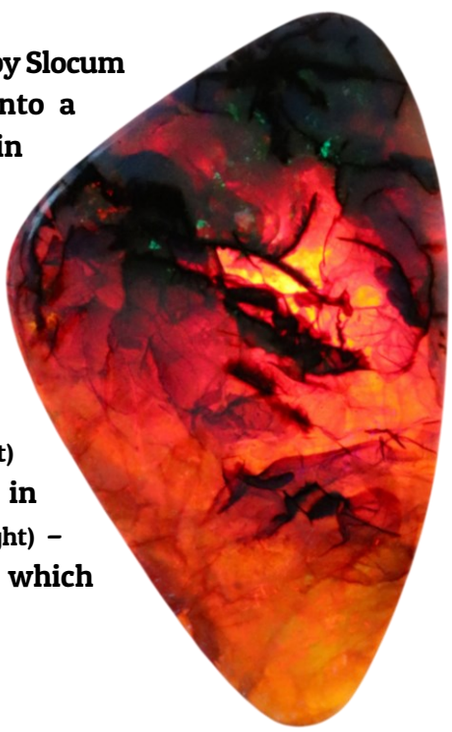






The spectral colours displayed by Slocum Stone (Top Left) transform into a set of interference colours in transmitted light (Top Right). This is especially helpful for stones with a pinfire play-of-colour – where the 'films' aren't easily examined (Centre Left & Right).

Sterling Opal (Bottom Left) appears orange to red in transmitted light (Bottom Right) – in contrast to natural opal which appears yellow.



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The following table of specific gravities is based on the artificial opals in our collection:

Material	Specific Gravity
Mylar in Resin	**1.22**
Coarse-crystalline Non-directional Opal	**1.31**
Aurora Opal	**1.43**
Sterling Opal	**1.68-1.79**
Resin-backed	1.58-1.59
Light, vein-free	1.73
Kyocera Opal	**1.72-1.91**
Mosaic Opal (Kyocera Opal shards in Resin)	**2.00**
Crushed Opal (Gilson Opal set in glass)	**2.24**
Gilson Opal	**2.24-2.27**
Slocum Stone	**2.41-2.51**
Opalite (Opalescent Glass)	**2.45-2.56**
Foil in Glass	**3.40**
Dragon's Breath Glass	**3.58-3.77**