"Baader-U" Filter for "terrestrial" photography

A customer review by Dr. Kai Böge | November 10th, 2015
Gymnasium Hochdahl

CMOS-sensors have a certain sensitivity in the UV-A-part of the spectrum. If you remove the UV- and IR-blocking filter which is mounted in front of the sensor of commercial cameras, you can exploit this sensitivity for photography.
But for this you have to block the VIS- and NIR-part of the spectrum, because the camera has a much greater sensitivity for those wavelengths.
First tests with a UG-1-filter (formerly Schott, now ITOS) proved that these filters still have some transmission in NIR. In combination with a CMOS-sensor with its higher sensitivity in NIR, any photo taken with this filter at daylight will show only a NIR-image.

The „**Baader U-Filter ZWL 350 nm**“ is made from UG-11x-glass. It still has the UV-A-transmission, but it blocks almost all of the NIR.
As far as I know, only this filter makes it possible to take images exclusivly in the UV-A spectral range.

As a teacher for physics and chemistry, I'm always searching for exiting and surprizing ways to get my pupils interested in and fascinated by natural sciences. This was easily possible with a „full-spectrum-DSLR“ and the „Baader U-Filter ZWL 350 nm“.

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At first, it was easily possible to show the UV-markings of many plants. These dark spots in the center of many blossoms guide insects to the stem of the blossom. When looking at Myosotis („forget-me-not“), we saw that new blossoms appear bright in UV-A, while pruinosed blossoms are almost dark. In the visual part of the spectrum, there is almost no difference between these blossoms – a fact which is rarely mentioned in the literature (see page 2).

We were also able to demonstrate the effectivity of suntan lotion. The combination of the camera with liveview and a laptop as a „mirror“ was very impressive for the children. Not only the „black“ color of the sunscreen was astounding, but also the visibility of different pigmentations like freckles (see page 2).

We could also show the much thicker haze in UV-A – especially in comparison to NIR – and the strong absorption of UV-A by highlighters, which is necessary to understand how they work. We could also experiment with the different UV-A-transmission of spectacle lenses and normal windows and discuss the results.

Blossoms of dandelions, photographed with a full-spectrum EOS 500D without a filter. Manual white balance with a Kodak gray chart.

Blossoms of dandelions, photographed with a full-spectrum EOS 500D and a UG-1-filter. Manual white balance with a Kodak gray chart. The UV-A-reflexion is completely outshone by the NIR-wavelengths.

Blossoms of dandelions, photographed with a full-spectrum EOS 500D and a 2“ Baader U-Filter ZWL 350 nm. Manual white balance with a Kodak gray chart. Only this filter shows the UV-A-markings

In combination with a modified „full-spectrum-camera“, the Baader-U-Filter is a very versatile and interesting tool for scientific education.

DETAILS ABOUT CAMERA MODIFICATION AND TECHNIQUE

All images were taken with a Canon EOS 500D. UV- and IR-filters were removed following the instructions from Gary Honis. The sensor was protected by a piece of quartz glass (a cut and smoothed cover slip for microscopy).
Selection of the display window and focussing were done in live-view-mode.

We did try several lenses. Very good results for close objects regarding ooking at sharpness and UV-transmission were achieved with an Isco Westron 1:3.5/35 mm. For movies, we did use the Canon EF 1:1.8/50mm because of its high lens speed and its surprisingly good UV-transmission. All in all, we did try about a dozen lenses. The 2“-Baader-U-Filter was always mounted in front of the front lens.

Forget-me-nots, photographed with a full-spectrum EOS 500D. The typically blue leafes appear pale-violet

Forget-me-nots in UV-A. Some blossoms appear very bright, others almost black.

Suntan lotion in UV-A with Baader U-filter. It is invisible in visible light.