| Handheld Hair Drug Analyzer | GA500BT |
|---|---|

## Features

- Fast detection

- High sensitivity: the lowest detectable drug content of 0.2ng/mg, and

- The Narcotics Association's industry standards are consistent.

- Convenient sampling: just a little hair (5mg), does not involve privacy,

- Avoid adulterated switch packs.

- Long traceability period: Suspicious persons can be detected within 3-6 months using hair

- Whether there are drugs in the body.

## Application

- Medical institution central laboratory
- Medical center
- Community medical point
- Driving school drug testing
- Research laboratories
- Public security anti-drug, forensic and other departments

## Description

GA500BT hair trace drug detection system is an automatic immunofluorescence detection system based on the principle of photoelectric detection. It needs to be used with special fluorescent immunological reagents. It can easily generate morphine, methamphetamine (commonly known as methamphetamine) and ketamine (commonly known as ketamine) in hair within 10 minutes. K powder) three common drugs, as well as fast and accurate detection results of methcathinone, ecstasy (MDMA) and cocaine, meeting the needs of qualitative and quantitative analysis.

The GA500BT hair trace drug detection system is equipped with an ID card identification module as standard, which can be used by public security police to enforce law on the spot when they go out to take pictures of drug addicts and verify their identity on the spot. The device has a built-in 4000 mAh battery, which can be used for one day (testing 200 people) after 1-2 hours of full power. It comes with a thermal printer, and the results are printed on site as the basis for on-site inspection and disposal by the public security anti-drug police.

| Model | Description |
|---|---|
| GA500 | With ID card reading function |
| GA500-3 | Triple card special equipment |
| GA500BT | Supports single card/triple card |
| GA500Pro | Android system, fingerprint recognition, support single card/triple card |

# 1. Background:

  With the accelerated development of globalization and society, drug crimes in China are showing a trend of high incidence and abuse. Relevant state departments attach great importance to anti-drug scientific research. Among them, improving drug detection technology has become an important part of anti-drug scientific research. During the anti-drug scene, the suspect did not cooperate with the detection, making it difficult for the police to obtain bodily fluids for drug detection. In order to solve the various disadvantages of the current public security anti-drug policemen's urine and saliva testing methods for drug addicts, and accurately serve the needs of actual anti-drug combat, use it in actual combat, and be close to actual combat work, the Ministry of Public Security issued the "Standards for Testing Hair Samples of Drug-Related Personnel", Put forward the requirements for the extraction, storage, inspection and testing of hair samples of drug-related personnel. According to this requirement, Optosky developed the GA500Pro handheld hair drug detector. At present, the product has obtained the product inspection report issued by the Safety and Police Electronic Product Quality Inspection Center of the Ministry of Public Security. The hair drug detection system has obtained the software copyright, software products and the scientific and technological novelty inspection report issued by the provincial science and technology department.

# 2. Advantages of hair detection:

  In order to accurately determine whether drug addicts have taken drugs, what kind of drugs they have taken, and whether there are still drug residues in the body of drug addicts, the application of various drug detection technologies has become an important part of anti-drug scientific research. At present, the main test objects are: hair drug test, blood test, urine test and saliva test.

| | Urine | Saliva | Blood | Hair |
|---|---|---|---|---|
| Difficulty of obtaining materials | Easy | Easy | Difficult | Easy |
| Sample Storage Requirements | High | High | High | Low |
| Ease of sample adulteration | Easy | Difficult | Difficult | Difficult |
| Sample susceptibility to contamination | Low | High | Low | Low |
| Timeliness of detection | 2-3 days | 1-2 days | 24h | 2 weeks to 6months after taking drugs |

Table 1 Comparison of various detection methods

Hair drug trace detection technology also has unique advantages, including long detection time limit, comprehensive drug or drug abuse information, anti-corruption samples, easy collection, easy storage, and repeatable sampling, etc. Among them, the long detection time limit is the most prominent advantage. According to the hair length, it can reflect the drug use situation of several weeks to several months, and the longest drug abuse history can reach 3-6 months. Combined with urine detection technology, it can be more comprehensive. Evaluate the drug abuse situation of the subjects to meet the needs of drug control and rehabilitation work.

# 3. Technical principle

Time-resolved fluorescence analysis (TRFIA) is developed on the basis of fluorescence analysis (FIA), which is a special kind of fluorescence analysis. It uses lanthanides to label antigens or antibodies. According to the luminescent characteristics of lanthanide chelates, it uses time-resolved technology to measure fluorescence, and simultaneously detects two parameters of wavelength and time for signal resolution, which can effectively eliminate the interference of non-specific fluorescence. Greatly improved analytical sensitivity.
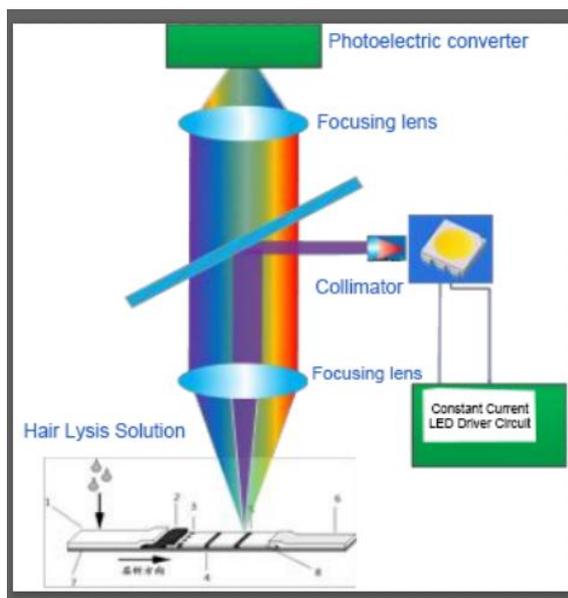


Figure1.GA500 Schematic

Fluorescence analysis utilizes the huge difference between the wavelength of fluorescence and its excitation wavelength to overcome the influence of variegated light in ordinary ultraviolet-visible spectroscopic analysis. At the same time, fluorescence analysis is different from ordinary spectroscopic analysis. It cannot directly reach the photoelectric receiver, thus greatly improving the sensitivity of optical analysis. However, when ultra-microanalysis is performed, the influence of stray light from the excitation light becomes serious. Therefore, solving the influence of stray light of the excitation light has

**Product data information is current as of publication data. Products conform to specifications per the terms of Optosky Standard warranty.**

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become a bottleneck in improving the sensitivity.

The best way to solve the effect of stray light is of course to measure without the presence of excitation light. However, the fluorescence lifetime of ordinary fluorescent markers is very short, and the excitation light disappears, and the fluorescence also disappears. However, there are very few rare earth metals (Eu, Tb, Sm, Dy) with long fluorescence lifetimes, up to 1-2ms, which can meet the measurement requirements, so a time-resolved fluorescence analysis method is produced, that is, using long-term fluorescent markers , an analysis method for measuring the fluorescence intensity after turning off the excitation light.

GA500BT Hair Drug Detector uses the time-resolved fluorescence analysis method. During detection, when the analyte in the sample forms an immune complex with the fluorescent-labeled antibody, and undergoes a chromatography process, they are respectively solidified in the dry fluorescent immunoassay reagent. In the detection area and control area of the card. The excitation light source irradiates the detection area and the quality control area of the well-reacted reagent card, which excites the solidified fluorescent complex to emit fluorescence, which is detected and converted into current by the photodiode. The magnitude of the current is proportional to the intensity of the fluorescence. The hand-held hair drug trace detector automatically calculates the concentration of the sample to be tested by analyzing the strength of the current. The GA500BT instrument has the characteristics of high detection accuracy, strong stability, fast detection speed, and rich test accessories. It can complete the detection within 10 minutes, and easily meets the needs of qualitative and quantitative analysis and scientific research of illegal drugs.

# 4. Detection process:
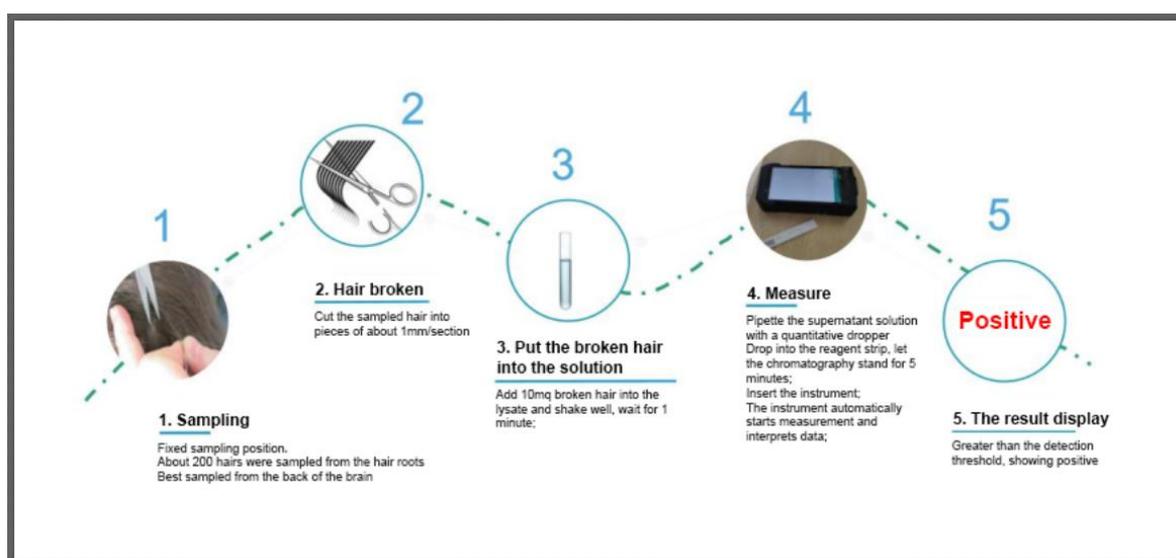


Figure 2 GA500BT detection process

# 5. Compared with other detection methods:

|  | Chromatography | ELISA | Colloidal gold method | Fluorescence analysis |
|---|---|---|---|---|
| Detection time | 2 hours | 2 hours | 5-10 minutes | 5-10 minutes |
| Sensitivity | High | Low | Low | High |
| Operation steps | complex | complex | simple | simple |
| Specificity | High | High | Low | High |
| On-site inspection | Impossible | Impossible | Achievable | Achievable |

# 6. Product features and advantages:

1) Advanced technology: Rare earth fluorescence technology is currently the newest and most accurate immunoassay rapid detection technology.

2) Rapid detection: Quantitative detection of drug content in hair samples of suspicious persons can be quickly completed within 10 minutes.

3) High sensitivity: The minimum detectable drug content is 0.2ng/mg, which is consistent with the industry standard of the Narcotics Control Association.

4) Sampling is convenient: just a little hair (5mg), does not involve privacy, and avoids adulteration.

5) Convenient storage: hair can be stored at room temperature, while urine, blood and other specimens generally need to be stored at low temperature.

6) Long traceability: hair can be used to detect whether there are drugs in the body of a suspicious person within 3-6 months.

7) Constant environment: The use of a constant temperature incubator can effectively eliminate the influence of time, low room temperature and other factors on the reaction.

8) Quantitative accuracy: accurate sampling method, constant experimental process, to ensure more reference quantitative test results

9) Simple operation: It only needs simple training for testing personnel to perform precise operation.

10) On-site detection: 5.5-inch display screen, 1.2kg, easy to carry, fully charged in 1-2 hours, can continuously detect 200 samples, and comes with a thermal printer.

# 7. Product specifications

| Performance | |
|---|---|
| Repeatability | Using an analog signal card: CV≤5%. |
| | Use supporting reagents: CV≤8%. |
| Stability | Using an analog signal card: the test results of the 4th and 8th hours after the instrument is turned on are in a stable working stateThe relative bias of the test results at the state , σ≤±8%. |
| | Use supporting reagents: the test results of the 4th and 8th hours after the instrument is turned on and in a stable working state are in a stable working stateThe relative bias of the test results in the state , σ≤±8%. |
| Linear dependence | Using an analog signal card: linear correlation coefficient (r)≥0.98. |
| | Use supporting reagents: linear correlation coefficient (r)≥0.98. |
| Accuracy | Using an analog signal card: Δn≤±8%. |
| | Use supporting reagents: Δn≤±15%. |
| Instrument interface | USB interface: used to upgrade the host computer program |
| | LIS interface: used to debug low-level programs |
| | SIM card slot: for inserting a phone card, connect to 4G |