



Figure. Graphite: Scanning electron microscopy (1200x)

milling and refining systems. The key part is beyond any doubts the big furnaces which are between ten and twenty meter long and *ca.* five meter high. Two big front electrodes are connected by means of a layer of graphite powder. This core is surrounded by specially selected carbons which are to be graphitised. A cover layer

of inert material protects the carbon from oxidation. By applying electrical current, the furnace starts to heat up and reaches internal temperatures of up to 3000°. The cooling process lasts several days.

The careful selection of raw materials, the special heating program and the high sophisticated way of assembling the ov-

ens makes the graphite unique in terms of high degree of crystallinity and purity. Thanks to the special cover layer a high yield of graphite can be achieved. The careful in-house development of grinding and refining equipment such as special micronizers and process control devices enables to maintain the purity as well as crystallinity of the raw graphite besides the guarantee of a high consistency. A variety of treatments result in many different graphite powders which are used in over twenty applications.

In order to be able to control and to prove the unique characteristics of the graphites the analytical labs have to be equipped accordingly. Emission spectroscopy or laser diffractometry are only two examples of the high sophisticated analytical methods used.

5. Typical Characteristics of Synthetic Graphite Produced in Bodio

The following data of typical characteristics demonstrate the high quality level of *Lonza Graphite*:

- Purity >99.9% C
- Crystallinity >98% graphitised
- Real density *ca.* 2.235 g/cm³

[1] P.L. Walker, 'Chemistry and Physics of Carbon' 2,3,4, Marcel Dekker Inc., New York-Basel, 1966.

[2] W. N. Reynolds, 'Physical Properties of Graphite', Elsevier Publishing Co., New York, 1968.

[3] L.C.F. Blacman, 'Modern Aspects of Graphite Technology', Academic Press, New York, 1970.

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Micro-Macinazione SA*

Since over 25 years, *Micro-Macinazione SA* is among the leaders, in Europe, in the field of Pharmaceuticals Custom Micronizing Service, in the strict respect of Good Manufacturing Practices. The plant, located in Molinazzo di Monteggio, has a yearly capacity of over 400 t with seven different sized air Jet-Mills installed.

The Company is projecting internally its micronizing equipments, which are patented and sold under the brand name of 'CHRISPRO JET-MILLS'.

Special plants for micronization under nitrogen atmosphere or under sterile conditions are available on Customer's demand. The Company is also projecting

and assembling auxiliary micronizing equipments as feeders, cyclons, sieves, *etc.*, sold under the brand name of 'TEC-PRO-EQUIPMENTS', as well as all the original spare parts.

More than 170 plants of *Micro-Macinazione SA* are installed, worldwide, in the most important chemical and pharmaceutical industries: from research laboratories purposes to the production on industrial scale.

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Micronizing with our plants takes place exclusively with compressed air, filtered, dried and oilfree; the absence of mechanical rotating parts guarantees a contamination-free finished product; furthermore, the low exercise temperature during the working procedure allows the micronization of soft and thermolabile substances. The installations are easy to clean, have very low cost of maintenance and useful long-life for at least ten years.

Micro-Macinazione SA employs 20 people, has a capital share of CHF 1 000 000.- and operates in a factory of its own property. From beginning 1995 *Micro-Macinazione SA* will start the micronization of β -lactame products in a new production building, separated from the existing factory and fully dedicated to this processing. The Customers of *Micro-Macinazione SA* are the most reputed Swiss and European Pharmaceuticals Companies.



Figure. CHRISPRO JET-MILL MC 500

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exact requirements of this business. It supports its activities by its own research and develops its own production techniques and patents.

Nuova Linnea SA*

Nuova Linnea is a manufacturer of pharmaceutical ingredients, with a difference: its products are derived from raw materials of botanical origin. It is a specialized company, employing over 60 people, and is located in the Canton of Ticino, Switzerland.

Brief History

The company started out under the name *Linnea SA* in 1980. It was established in Riazzino, still its present location, on a site which had previously housed a small fine chemicals company, and which provided some 'seed' technology for the new enterprise. Additional investment in modern equipment, technology, and human resources enabled the company to develop during the 1980's. However, it was not until the company, then renamed *Nuova Linnea*, was taken over by a multi-

national group in 1990 that it realized its true potential. Its nucleus of skilled scientists and technicians was expanded, and additional resources were put into commercial and technical activities. The years since then have been marked by rapid growth and success in the marketplace.

Specialized Field

Nuova Linnea is at the forefront of its field in Switzerland. Its speciality is the recovery of pharmacologically-active compounds that are found in nature, starting from raw materials that sometimes are only obtainable in remote parts of the world. In many cases these compounds are highly sensitive to industrial conditions, and great care must be taken during processing in order to protect their therapeutic properties. The compounds themselves are produced either in their purified form, or they are transformed by chemical synthesis into derivative ('semi-synthetic') products, depending on the requirements. *Nuova Linnea* is equipped with up-to-date equipment capable of meeting the

Rigorous Quality Control

Active compounds of the type produced by *Nuova Linnea* are found only in minute quantities in their natural state, so the manufacturing operations must be designed to keep track of the compounds at low concentrations as they proceed through the process. The quality and quantity of the products must be monitored in detail at every step, and this function is carried out by the company's Quality Control department. Being a Swiss company, it already has the traditional reputation for Swiss quality to uphold. In addition it operates to the internationally-recognized GMP (Good Manufacturing Practice) standards set by the United States Food and Drug Administration.

To *Nuova Linnea*, quality is paramount. A team of well-qualified and experienced people ensures that its customers receive only the highest quality products.

Future Potential

Many of the world's most reliable medicines have been derived from natural sources and indeed, it is estimated that

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