10/05/2021

Popular science abstract

Jean-Baptiste Diop – Material Science Master thesis project

Knowing tablets' porosity for medications of quality

In modern society, health and well-being have become major concerns and elementary criteria towards progress. Consequently, medical and pharmaceutical sciences have been constantly improving, bringing new solutions to treat diverse kind of illness. Medical tablets have thus undertaken an important role to reach this ideal.

The general aim of a medicine is simple: release molecules that will shut the compounds bringing symptoms and pain. However, the quality of a medication, considering efficiency and minimal secondary effect is directly related to how the active substances are released, in what quantity and for how long. In other words: how it is dissolving.

Studies have shown that the dissolution rate is directly link to the porosity of the medicine, which has been used to accelerate the release of the active substance. Porosity also permits to program the moment of drug release in the body and therefore target specific area in the digestive system. With this technic, it has been possible to reduce the doses prescribed, for lower secondary effects while keeping an efficient medication. We understand then how important controlling and knowing the porosity of a tablet is important to treat patients in the most efficient and safest way.

Gasporox AB has recently developed a technique that might have a huge impact on the pharmaceutical industry. Based on two laser techniques measuring the light absorption of oxygen and the diffusion of light in matter, a new precise way to measure porosity has been developed. Being non-destructive and fast, this technique could substitute the so far most common technique used, mercury intrusion, which showed to be highly toxic, destructive and polluting. It is hoped that with such a remarkable technology, it will be possible to control the porosity on production lines and improve the use of porosity to drive dissolution. Firstly, it will be possible to control every single tablet exiting a pharmaceutical factory, augmenting the product quality. Secondly, it will be possible to conduct larger studies to relate porosity to dissolution and digestion, meaning that the medication will be drastically improved in the future.

Among others, let's introduce one example application that might be drastically developed thanks to this method. In the case of chemotherapy, radioactive gamma-rays are most commonly used to penetrate the body and treat all cells indistinctively if their healthy or cancerous, which is unfortunately bringing many secondary effects. However, using alpha or beta radiations is known to be safer as they only have a local activity. A lot of research work is conducted nowadays to develop targeted alpha-particle therapy (TAPT), that would enable to target cancerous cells and release alpha radiations emitters on them. In order to target precisely the cancerous cells, the control of drug dissolution is key. We therefore understand that spectroscopic porosity control is not only an improvement for the pharmaceutical industry, but could indirectly extend the treatment possibilities regarding diverse diseases.