# POROUS IMPLANT DEVICE WITH IMPROVED CORE

## CLAIM OF PRIORITY

This application is a continuation of U.S. patent application Ser. No. 12/624,608, filed on Nov. 24, 2009, now issued as U.S. Pat. No. 8,602,782; the benefit of priority of which is claimed hereby, and of which is incorporated by reference herein in its entirety.

## BACKGROUND

1. Field of the Invention

The present invention relates to porous implants and, in particular, to an implant with a porous material mounted on a core.

2. Description of the Related Art

Dental implants are commonly used to anchor dental restorations or prosthetic teeth at one or more edentulous sites in a patient's dentition at which the patient's original teeth have been lost or damaged. The dental implant is typically threaded or press-fit into a bore which is drilled into the patient's mandible or maxilla at the edentulous site. Typically, a dental implant device is provided in one or two pieces. For a two piece device, an anchoring member or implant supports a separate coronal dental abutment, which in turn provides an interface between the implant and a dental restoration. For a one piece integral device, the device has an abutment section coronal to an implant section of the device. In either case, the restoration is typically a porcelain crown fashioned according to known methods.

For a two-piece device, there are two-stage surgery implants (also called endosseous implants) that only rise to the crest of the mandible or maxilla. In this case, the surgery is often performed in two stages. In the initial stage, an incision is made in the patient's gingiva at an edentulous side, and a bore is drilled into the patient's mandible or maxilla at the edentulous site, followed by threading or impacting a dental implant into the bore using a suitable driver. Thereafter, a cap is fitted onto the implant to close the abutment coupling structure of the implant, and the gingiva is sutured over the implant. Over a period of several months, the patient's jaw bone grows around the implant to securely anchor the implant in the surrounding bone, a process known as osseointegration.

In a second stage of the procedure following osseointegration, the dentist reopens the gingiva at the implant site and secures an abutment and optionally, a temporary prosthesis or temporary healing member, to the implant. Then, a suitable permanent prosthesis or crown is fashioned, such as from one or more impressions taken of the abutment and the surrounding gingival tissue and dentition. The temporary prosthesis or healing member is removed and replaced with the permanent prosthesis, which is attached to the abutment with cement or with a fastener, for example.

Alternatively, a one-stage surgery, two-piece implant, also called a transgingival implant, is placed in a single stage because it extends through the gingiva for attachment to an abutment. The one-piece implant also is placed in the jaw in a single stage.

Although the osseointegration of existing dental implants into surrounding bone has proven adequate, further improvements in osseointegration of dental implants are desired. For example, patients would prefer the shortest healing time from surgery to the time the implant can be fully impacted by occlusal forces. Also, a desire exists to provide strongly osseointegrated implants for high risk patients, such as smokers, diabetics and/or abnormally slow bone growth.



## BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a side perspective view of a dental implant device;

FIG. **2** is an exploded perspective view of the dental implant device of FIG. **1**;

FIG. **3** is a bottom, cross-sectional view of the dental implant device of FIG. **1** taken along the line **3-3** shown on FIG. **1**;

FIG. **4** is a close-up, fragmentary view of a porous material on the dental implant device of FIG. **1**;

FIG. **5** is a side, cross-sectional view of an alternative dental implant device;

FIG. **6** is a side, partially cross-sectional view of yet another alternative dental implant device; and

FIG. **7** is a side, cross-sectional view of a further alternative dental implant device.

## DETAILED DESCRIPTION

Referring to FIGS. **1-3**, to improve osseointegration onto the implant, an implant device **10** for placement in bone has an exterior portion **12** made of a porous material **14** that bone can grow into to improve long term stability of the implant device. Such a porous material may also increase short term stability for immediate loading because of its large friction coefficient with surrounding bone as explained in greater detail below. The exterior portion **12** may be placed on or around an interior portion or core **16** that supports the exterior portion and adds strength to the implant device **10**. The core **16** may have a surface treatment **18** to further improve osseointegration with bone that has grown through the exterior portion **12** and onto the core **16**. Alternatively, or additionally, the core **16** may also have an outer shape or periphery **19** configured to limit rotation of the exterior portion **12** relative to the core **16** for proper placement of the implant **10** in a bore in bone and to increase both long term and short term stability.

Now in more detail, in the illustrated example, the implant **10** is a dental implant for insertion into a mandible or maxilla. The implant **10** is used to anchor one or more dental prostheses, and includes a coronal head portion or head **20**. The interior portion or core **16** extends apically from the head **20**. In one form, the head **20** and core **16** are integrally formed but may be separate pieces secured to each other by threading, friction fit, welding (laser or e-beam), and so forth. A separate anchor **22** (also referred to as the stem or apical portion) is configured to engage the core **16** so that the head **20** and the anchor **22** cooperatively retain the porous exterior portion **14** therebetween on the implant **10**.

For the illustrated example, the coronal end **24** of the head **20** is configured with male or female engagement structure that receives corresponding structure from a separate abutment. It will be appreciated, however, that instead of the two-stage implant **10** shown, the head **20** may have an extended height to extend through gingiva and form a single-stage implant, or may have an integral abutment to form a one-piece implant.

The head **20** has an outer cylindrical or tapering surface **26** that extends to an apical end surface **28**. The core **16** has a reduced outer diameter compared to the diameter of the outer surface **26** and extends apically from an apical end surface **28** of head **20** so that apical end surface **28** forms a