

“Dental Materials at a Glance”

By J. A. von Fraunhofer (Baltimore College of Dental Surgery, University of Maryland, USA), Wiley-Blackwell, Chichester, UK, 2010, 72 pages, ISBN 978-0-8138-1614-2, £19.99, €28.40, US\$33.99

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Introduction

The use of platinum and palladium for dental applications totalled just less than 700,000 oz in 2009, equating to 5% of total demand for the two metals. In recent years, demand for platinum group metals (pgms) in this sector has declined through a combination of high raw material prices and competition from alternative technologies, such as base metals and full ceramic reconstructions. The pgms are still widely used as alloying additions in both high-and low-gold alloys and, particularly in Japan, palladium alloys are used in many dental restorations (1).

“Dental Materials at a Glance”

This book, by J. A. von Fraunhofer, Professor Emeritus at the Baltimore College of Dental Surgery in the USA, forms part of the ‘at a Glance’ series, and covers the wide variety of materials and techniques used in the dental industry in a series of concise chapters. Clearly illustrated, with pictures and data tables, this book is aimed at dental professionals and students to provide an easy to use reference of modern dental materials and methods. Dedicating two pages to each subject makes this book highly accessible and a useful reference tool, but could be considered to lack detail on the individual topics.

The pgms are mentioned in three chapters of the book. First, the ‘Precious metal alloys’ chapter covers their more obvious use for crowns and bridges (**Figure 1**), looks at the different alloy types available, and discusses their relative properties. Any of the pgms can be used in these alloys, with platinum and palladium being the most common. Rhodium, iridium, osmium and ruthenium can also be used in smaller amounts to further modify the properties of the alloy. Benefits of the different alloys are discussed along with tables of their physical properties. Some examples of precious metal alloys and their applications in dental work are shown in **Table I**.

The second chapter covering the use of pgms, ‘Elastic impression materials’, concerns their application as curing catalysts. These addition-cured silicone-based materials use a proprietary modified



Fig. 1. Porcelain veneered high-gold precious metal bridgework. Such alloys typically contain small additions of platinum and/or palladium (Photo courtesy of Heraeus Kulzer GmbH)

Table I

Some High-Gold Precious Metal Alloys Used in Dentistry^a

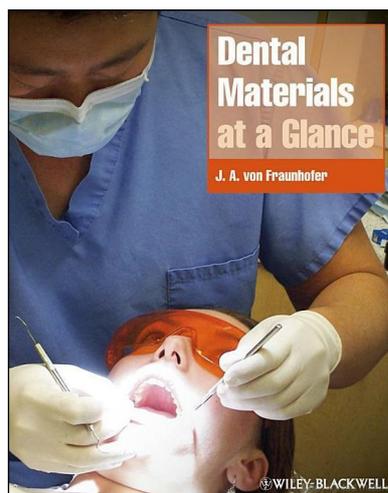
Property	Type I	Type II	Type III	Type IV
Au content (%)	81–83	76–78	73–77	71–74
Pt content (%)	–	–	–	0–1
Pd content (%)	0.2–4.5	1–3	2–4	2–5
Characteristic	Soft	Medium	Hard	Very hard
Application	Occlusal inlays	Intracoronal inlays	Onlays, crowns, bridgework	Removable partials

^aTable adapted from 'Precious metal alloys', in "Dental Materials at a Glance", Chapter 10

chloroplatinic acid catalyst to harden the impression material, which is used to make casts of existing teeth. The elastic properties allow the hardened silicone to be withdrawn from the mouth without damaging the teeth while at the same time retaining its shape.

Finally in the 'Porcelain bonding alloys' chapter, high- and low-gold alloys are compared to palladium alloys with cobalt, copper and/or silver and base metal alloys for their use in porcelain-bonded-to-metal restorations. Each alloy has its benefits and weaknesses where performance and cost are concerned, and these are discussed and tabulated in the chapter.

Overall this book provides an interesting brief overview of dental materials, and would be useful to anyone interested in or working in the field.



"Dental Materials at a Glance"

Reference

- 1 D. Jollie, "Platinum 2010", Johnson Matthey, Royston, UK, 2010: <http://www.platinum.matthey.com/publications/pgm-market-reviews/archive/platinum-2010/> (Accessed on 26th August 2010)

The Reviewer

Dr Dan Carter graduated with an MChem (Hons) from the University of Wales, Swansea, UK, and a PhD in Inorganic Chemistry from the University of Nottingham, UK. He is currently Senior Analyst in the Johnson Matthey Market Research team, focusing on the automotive, electronics, fuel cell and dental sectors.

Palladium in Dentistry

Platinum-containing high-gold alloys have been used by dentists for many decades but the use of palladium in dentistry is relatively recent. It dates from the 1980s, when a rise in the price of gold encouraged palladium to be introduced as a lower-cost alternative.

In Japan, the government operates a specific mandate stating that all government-subsidised dental alloys have to include a palladium content of 20%. This alloy is known as the kinpala alloy and is used in around 90% of all Japanese dental treatment. Hence, Japan is the largest palladium-consuming region for dental applications, followed by North America and then Europe.

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