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Detrital pyrite: a revised classification scheme and application to placer gold deposits

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Pyrite is one of the most abundant ore minerals in gold-bearing conglomerates (reefs) of the Witwatersrand Basin. Much of it is detrital in origin and thus survived weathering and transport to the depositional basin as clasts, although authigenic types, formed *in situ* within the depositional site as a result of post-depositional processes are also found. As the pyrite is frequently associated with gold [1], many authors have developed different pyrite classification schemes in order to better understand the nature and origin of the reefs and the environmental conditions of their formation. We propose a new classification scheme for detrital pyrite. The scheme was developed by comparing the description of the different textures, shapes and sizes from several previous studies on detrital pyrite from the Wits Basin (Table 1). The new classification scheme for detrital pyrite was created in order to have a consistent framework for petrographic description of pyrite in clastic sedimentary rocks, such as the Witwatersrand gold reefs. The new scheme also allows the reader to compare and contrast different detrital pyrite types from previous studies.

| | Ramdohr [2] | Saager & Mihálik [3] | Saager [4] | Saager [5] | Utter [6] | Hallbauer & von Gehlen [7] | Barton & Hallbauer [8] | England et al [9] | Guy et al (2012) [10] | Guy et al (2014) [11] |
|---|---|----------------------|------------------------|-----------------------|---|----------------------------|--------------------------------------|--|-----------------------|-----------------------|
| Type M: Massive (= < 10% inclusions) | Pebble pyrite | Isotropic pyrite | Compact rounded pyrite | Allogenic pyrite | Type 2: Allogenic rounded compact pyrite (al. c. p) | Allogenic detrital pyrite | Compact, rounded pyrite | Compact pyrite | DET-1 | DET-1 |
| Type I: inclusion-bearing pyrite (= > 10% inclusions) | Type IC: Concentrically laminated | | | | Colloform pyrite | | | Oolitic-colloform pyrite | | SYN-1; DIA-5 (b) |
| | Type IR: Random inclusion | Porous pyrite | Anisotropic pyrite | Porous rounded pyrite | Type 3: Allogenic rounded porous pyrites (al. p. p) – well rounded variety; inclusions in pyrite type 3 | | | | DET-2 | DET-2 |
| | Type IP: Planar laminated | | | | Type 3: Allogenic rounded porous pyrites (al. p. p) – banded variety | | | Banded pyrite | | DIA-5 (c) |
| Type C: Crystalline (massive or with inclusions) | Concretionary pyrite; skeletal concretions; compact, radial concretions | | | | | | Concretionary pyrite; mudball pyrite | Concretionary pyrite; dendritic pyrite | | DIA-5 (a) |

Table 1: Detrital pyrite classification.

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