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Paper 51
Entered: October 31, 2016

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

UMICORE AG & CO. KG,
Petitioner,

v.

BASF CORPORATION,
Patent Owner.

Case IPR2015-01123
Patent 8,404,203 B2

Before CHRISTOPHER L. CRUMBLEY, JO-ANNE M. KOKOSKI, and JEFFREY W. ABRAHAM, *Administrative Patent Judges.*

KOKOSKI, *Administrative Patent Judge.*

FINAL WRITTEN DECISION
35 U.S.C. § 318(a) and 37 C.F.R. § 42.73

I. INTRODUCTION

Umicore AG & Co. KG ("Petitioner") filed a Petition ("Pet.") to institute an *inter partes* review of claims 1–31 of U.S. Patent No. 8,404,203 B2 ("the '203 patent," Ex. 1001). Paper 1. On November 2, 2015, we instituted an *inter partes* review of claims 1–31 on two grounds of unpatentability. (Paper 8, "Dec. on Inst."). BASF Corporation ("Patent Owner") filed a Patent Owner Response (Paper 24, "PO Resp."). Petitioner filed a Reply (Paper 34, "Reply").

Petitioner supports its Petition with Declarations by Johannes A. Lercher, Ph.D. ("the Lercher Declaration," Ex. 1008) and Dr. Frank-Walter Schütze ("the Schütze Declaration," Ex. 1015). Patent Owner relies on Declarations by Dr. Michael Tsapatsis ("the Tsapatsis Declaration," Ex. 2018), Dr. Ahmad Moini ("the Moini Declaration," Ex. 2019), and Olivia Schmidt ("the Schmidt Declaration," Ex. 2034).

Petitioner filed a Motion to Exclude (Paper 40) certain paragraphs of the Tsapatsis Declaration, the Moini Declaration, and the Schmidt Declaration. Patent Owner filed an Opposition (Paper 44), and Petitioner filed a Reply (Paper 45).

An oral hearing was held on July 28, 2016. A transcript of the hearing is included in the record (Paper 50, "Tr.").

We have jurisdiction under 35 U.S.C. § 6. This Final Written Decision is issued pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. For the reasons that follow, we determine that Petitioner has shown by a preponderance of the evidence that claims 1–31 of the '203 patent are unpatentable.

A. The '203 Patent

The '203 patent, titled "Processes for Reducing Nitrogen Oxides Using Copper CHA Zeolite Catalysts," is directed to methods of manufacturing copper CHA[1] zeolite catalysts and their use in exhaust gas treatment systems. Ex. 1001, 1:19–22. The Specification describes embodiments where the "catalyst compris[es] a zeolite having the CHA crystal structure and a mole ratio of silica to alumina greater than about 15 and an atomic ratio of copper to aluminum exceeding about 0.25." *Id.* at 2:13–16. The catalyst can be "deposited on a honeycomb substrate," which can comprise a wall flow substrate or a flow through substrate. *Id.* at 2:41–45. The '203 patent also describes embodiments where "at least a portion of the flow through substrate is coated with CuCHA adapted to reduce oxides of nitrogen contained in a gas stream flowing through the substrate," and those where "at least a portion of the flow through substrate is coated with Pt and CuCHA adapted to oxidize ammonia in the exhaust gas stream." *Id.* at 2:45–51; *see also id.* at 2:53–58 (describing embodiments where at least a portion of the wall flow substrate "is coated with CuCHA adapted to reduce oxides of nitrogen contained in a gas stream flowing through the substrate," and those where "at least a portion of the wall flow substrate is coated with Pt and CuCHA adapted to oxidize ammonia in the exhaust gas stream.").

The '203 patent further describes "a process for the reduction of oxides of nitrogen contained in a gas stream in the presence of oxygen wherein said process comprises contacting the gas stream with the catalyst

[1] The parties agree that CHA crystal structure is defined by the International Zeolite Association, and that zeolites having the CHA crystal structure are also known as "chabazite." Pet. 8; PO Resp. 11.

described above." *Id.* at 3:8–11. Figure 10A of the '203 patent is reproduced below:

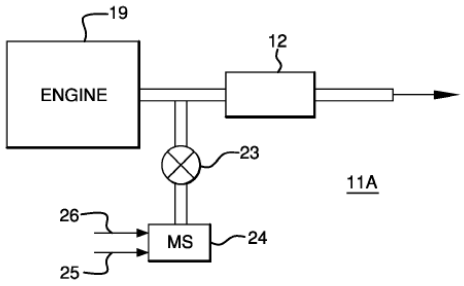

FIG. 10A

Figure 10A is a schematic depiction of an embodiment of the emissions treatment system described in the '203 patent. *Id.* at 4:11–13. Engine 19 emits an exhaust stream containing gaseous pollutants and particulate matter, which is conveyed to a position downstream from engine 19 "where a reductant, i.e., ammonia or an ammonia-precursor, is added to the exhaust stream." *Id.* at 21:61–66. Aqueous urea, for example, is an ammonia precursor that enters mixing station 24 on line 25 along with air from line 26. *Id.* at 22:1–3. Valve 23 is used to meter precise amounts of aqueous urea to be added to the exhaust stream; the aqueous urea is converted to ammonia in the exhaust stream. *Id.* at 22:3–5. The exhaust stream containing ammonia is then conveyed to "catalyst substrate 12 (also referred to herein including the claims as 'the first substrate') containing CuCHA in accordance with one or more embodiments." *Id.* at 22:6–9. "On passing through the first substrate 12, the NOx component of the exhaust stream is converted through the selective catalytic reduction of NOx with NH_3 to N_2 and H_2O." *Id.* at 22:9–12.

The '203 patent also describes an embodiment that "contains a second substrate 27 interposed between the NH_3 injector and the first substrate 12."

Id. at 22:18–21, Fig. 10B. The second substrate is coated with a catalyst composition that can be the same as, or different from, that coated on the first substrate. *Id.* at 22:21–24. In another embodiment, an oxidation catalyst is included "upstream of the site of ammonia/ammonia precursor injection." *Id.* at 22:49–51, Fig. 10C. The "oxidation catalyst is disposed on a catalyst substrate 34," and the system can also include first substrate 12 and second substrate 27. *Id.* at 22:51–54. In this embodiment, the exhaust stream is conveyed first through catalyst substrate 34, "where at least some of the gaseous hydrocarbons, CO and particulate matter are combusted to innocuous components." *Id.* at 22:54–57. According to the '203 patent, "the first substrate 12 could be a catalyzed soot filter" with the CuCHA catalyst disposed thereon, and "the second substrate 27 comprising" a CuCHA catalyst "may be located upstream from catalyst substrate 34." *Id.* at 22:62–67.

Claims 1 and 26 are independent claims. Claims 2–25 depend, directly or indirectly, from claim 1, which is reproduced below:

> 1. A process for the reduction of oxides of nitrogen contained in a gas stream in the presence of oxygen wherein said process comprises contacting the gas stream with a catalyst comprising a zeolite having the CHA crystal structure and a mole ratio of silica to alumina from about 15 to about 100 and an atomic ratio of copper to aluminum from about 0.25 to about 0.50.

Ex. 1001, 23:9–15.

Claims 27–31 depend, directly or indirectly, from claim 26, which is reproduced below:

> 26. A process for the reduction of oxides of nitrogen contained in a gas stream in the presence of oxygen wherein said process comprises adding a reductant to the gas stream and contacting the gas stream containing the reductant with a catalyst

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