

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property
Organization
International Bureau

(43) International Publication Date
24 February 2022 (24.02.2022)



(10) International Publication Number
WO 2022/039676 A1

(51) International Patent Classification:

C09J 11/06 (2006.01) C09J 163/02 (2006.01)
C09J 167/04 (2006.01) C08K 9/04 (2006.01)
C09J 11/04 (2006.01)

(21) International Application Number:

PCT/SG2021/050490

(22) International Filing Date:

20 August 2021 (20.08.2021)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

10202008040V 21 August 2020 (21.08.2020) SG

(71) Applicant: **NANYANG TECHNOLOGICAL UNIVERSITY** [SG/SG]; 50 Nanyang Avenue, Singapore 639798 (SG).

(72) Inventors: **STEELE, Terry, W., J.**; c/o Nanyang Technological University, 50 Nanyang Avenue, Singapore 639798

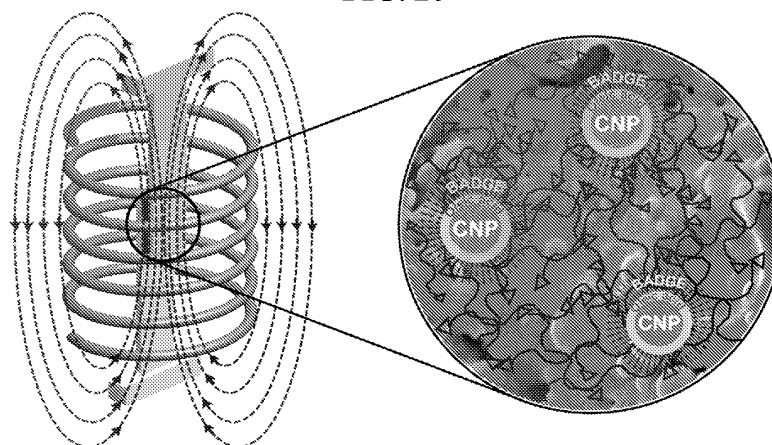
(SG). **RAMANUJAN, Raju, V.**; c/o Nanyang Technological University, 50 Nanyang Avenue, Singapore 639798 (SG). **CHAUDHARY, Richa**; c/o Nanyang Technological University, 50 Nanyang Avenue, Singapore 639798 (SG).

(74) Agent: **VIERING, JENTSCHURA & PARTNER LLP**; P.O. Box 1088, Rochor Post Office, Rochor Road, Singapore 911833 (SG).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, IT, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, WS, ZA, ZM, ZW.

(54) Title: INDUCTION HEATING-CURED ADHESIVES

FIG. 20



(57) Abstract: Herein disclosed is an adhesive additive for magnetically curing an adhesive. The adhesive additive includes a magnetic nanoparticle that includes (i) a metal, wherein the metal comprises iron, manganese, cobalt, nickel, and/or zinc, or (ii) a metal oxide, wherein the metal oxide contains a metal which includes iron, manganese, cobalt, nickel, and/or zinc, a coating on the magnetic nanoparticle, wherein the coating comprises (a) a surfactant or an inorganic material, and (b) a monomer or a polymer which is miscible with an adhesive substrate which the adhesive additive is incorporable to, wherein the magnetic nanoparticle produces thermal energy in response to an alternating magnetic field applied thereto for the adhesive substrate to form cross-linkages. An adhesive, which is magnetically curable, is also disclosed herein. The adhesive includes the adhesive additive and an adhesive substrate. Methods of forming the adhesive additive are further disclosed herein.

[Continued on next page]

(84) Designated States (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:

- *with international search report (Art. 21(3))*
- *in black and white; the international application as filed contained color or greyscale and is available for download from PATENTSCOPE*