

REFERENCES

- Aarthy, M., Saravanan, P., Gowthaman, M. K., Rose, C., & Kamini, N. R. (2014). Enzymatic transesterification for production of biodiesel using yeast lipases: An overview. *Chemical Engineering Research and Design*, *92*, 1591–1601.
- Abidin, S. Z. (2012). *Production of Biodiesel from Used Cooking Oil (UCO) using Ion Exchange Resins as Catalysts*. PhD. Thesis
- Ahn, J. H., Jang, J. E., Oh, C. G., Ihm, S. K., Cortez, J., & Sherrington, D. C. (2006). Rapid generation and control of microporosity, bimodal pore size distribution, and surface area in Davankov-type hyper-cross-linked resins. *Macromolecules*, *39*, 627–632.
- Alenezi, R., Leeke, G. A., Winterbottom, J. M., Santos, R. C. D., & Khan, A. R. (2010). Esterification kinetics of free fatty acids with supercritical methanol for biodiesel production. *Energy Conversion and Management*, *51*, 1055–1059.
- Alptekin, E., Canakci, M., & Sanli, H. (2014). Biodiesel production from vegetable oil and waste animal fats in a pilot plant. *Waste Management*, *34*, 2146–2154.
- Al-Widyan, M. I., & Al-Shyoukh, A. O. (2002). Experimental evaluation of the transesterification of waste palm oil into biodiesel. *Bioresource Technology*, *85*, 253–256.
- Amáis, R. S., Garcia, E. E., Monteiro, M. R., Nogueira, A. R. A., & Nóbrega, J. A. (2010). Direct analysis of biodiesel microemulsions using an inductively coupled plasma mass spectrometry. *Microchemical Journal*, *96*, 146–150.
- Andrijanto, E., Dawson, E. A., & Brown, D. R. (2012). Hypercrosslinked polystyrene sulphonic acid catalysts for the esterification of free fatty acids in biodiesel synthesis. *Applied Catalysis B: Environmental*, *115–116*, 261–268.
- Azad, A. K., Rasul, M. G., Khan, M. M. K., Sharma, S. C., & Hazrat, M. A. (2015). Prospect of biofuels as an alternative transport fuel in Australia. *Renewable and Sustainable Energy Reviews*, *43*, 331–351.
- Azad, A. K., Rasul, M. G., Khan, M. M. K., Sharma, S. C., Mofijur, M., & Bhuiya, M. M. K. (2016). Prospects, feedstocks and challenges of biodiesel production from beauty leaf oil and castor oil: A nonedible oil sources in Australia. *Renewable and Sustainable Energy Reviews*, *61*, 302–318.
- Banković-Ilić, I. B., Stojković, I. J., Stamenković, O. S., Veljkovic, V. B., & Hung, Y. T. (2014). Waste animal fats as feedstocks for biodiesel production. *Renewable and Sustainable Energy Reviews*, *32*, 238–254.
- Baroi, C., & Dalai, A. K. (2013). Simultaneous esterification, transesterification and chlorophyll removal from green seed canola oil using solid acid catalysts. *Catalysis Today*, *207*, 74–85.

- Baroi, C., & Dalai, A. K. (2014). Esterification of free fatty acids (FFA) of Green Seed Canola (GSC) oil using H-Y zeolite supported 12-Tungstophosphoric acid (TPA). *Applied Catalysis A: General*, *485*, 99–107.
- Baroi, C., Mahto, S., Niu, C., & Dalai, A. K. (2014). Biofuel production from green seed canola oil using zeolites. *Applied Catalysis A: General*, *469*, 18–32.
- Barrett, E. P., Joyner, L. G., & Halenda, P. P. (1951). The determination of pore volume and area distributions in porous substances. I. Computations from nitrogen isotherms. *Journal of the American Chemical Society*, *73*, 373-380.
- Baskar, G., Gurugulladevi, A., Nishanthini, T., Aiswarya, R., & Tamilarasan. (2017). Optimization and kinetics of biodiesel production from Mahua oil using manganese doped zinc oxide nanocatalyst. *Renewable Energy*, *103*, 641-646.
- Baskar, G., & Soumiya., S. (2016). Production of biodiesel from castor oil using iron (II) doped zinc oxide nanocatalyst. *Renewable Energy*, *98*, 101-107.
- Berrios, M., Martín, M. A., Chica, A. F., & Martín, A. (2010). Study of esterification and transesterification in biodiesel production from used frying oils in a closed system. *Chemical Engineering Journal*, *160*, 473–479.
- Berrios, M., Siles, J., Martín, M. A., & Martín, A. (2007). A kinetic study of the esterification of free fatty acids (FFA) in sunflower oil. *Fuel*, *86*, 2383–2388.
- Bianchi, C. L., Boffito, D. C., Pirola, C., & Ragaini, V. (2010). Low temperature de-acidification process of animal fat as a pre-step to biodiesel production. *Catalysis Letters*, *134*, 179–183.
- Boffito, D. C., Pirola, C., Galli, F., Di Michele, A., & Bianchi, C. L. (2013). Free fatty acids esterification of waste cooking oil and its mixtures with rapeseed oil and diesel. *Fuel*, *108*, 612–619.
- Boguslavsky, L., Baruch, S., & Margel, S. (2005). Synthesis and characterization of polyacrylonitrile nanoparticles by dispersion/emulsion polymerization process. *Journal of Colloid and Interface Science*, *289*, 71-85.
- Bora, P., Boro, J., Konwar, L. J., & Deka, D. (2016). Formulation of microemulsion based hybrid biofuel from waste cooking oil - A comparative study with biodiesel. *Journal of Energy Institute*, *89*, 560-568.
- Borges, M. E., & Díaz, L. (2012). Recent developments on heterogeneous catalysts for biodiesel production by oil esterification and transesterification reactions: A review. *Renewable and Sustainable Energy Reviews*, *16*, 2839–2849.
- Borges, M. E., Díaz, L., Alvarez-Galván, M. C., & Brito, A. (2011). High performance heterogeneous catalyst for biodiesel production from vegetal and waste oil at low temperature. *Applied Catalysis B: Environmental*, *102*, 310–315.
- Boz, N., Degirmenbasi, N., & Kalyon, D. M. (2015). Esterification and transesterification of waste cooking oil over Amberlyst 15 and modified Amberlyst 15 catalysts. *Applied Catalysis B: Environmental*, *165*, 723–730.

- Bratkowska, D., Fontanals, N., Borrull, F., Cormack, P. A. G., Sherrington, D. C., & Marcé, R. M. (2010a). Hydrophilic hypercrosslinked polymeric sorbents for the solid-phase extraction of polar contaminants from water. *Journal of Chromatography A*, *1217*, 3238–3243.
- Bratkowska, D., Marcé, R. M., Cormack, P. A. G., Sherrington, D. C., Borrull, F., & Fontanals, N. (2010b). Synthesis and application of hypercrosslinked polymers with weak cation-exchange character for the selective extraction of basic pharmaceuticals from complex environmental water samples. *Journal of Chromatography A*, *1217*, 1575–1582.
- Caetano, C. S., Caiado, M., Farinha, J., Fonseca, I. M., Ramos, A. M., Vital, J., & Castanheiro, J. E. (2013). Esterification of free fatty acids over chitosan with sulfonic acid groups. *Chemical Engineering Journal*, *230*, 567–572.
- Caetano, C. S., Guerreiro, L., Fonseca, L. M., Ramos, A. M., Vital, J., & Castanheiro. (2009). Esterification of fatty acids to biodiesel over polymers with sulfonic acid groups. *Applied Catalysis A: General*, *359*, 41-46.
- Cai, Z. Z., Wang, Y., Teng, Y. L., Chong, K. M., Wang, J. W., Zhang, J. W., & Yang, D. P. (2015). A two-step biodiesel production process from waste cooking oil via recycling crude glycerol esterification catalyzed by alkali catalyst. *Fuel Processing Technology*, *137*, 186–193.
- Canakci, M. (2007). The potential of restaurant waste lipids as biodiesel feedstocks. *Bioresource Technology*, *98*, 183–190.
- Canakci, M., & Gerpen, J. Van. (2001). Biodiesel production from oils and fats with high free fatty acids. *Transactions of the ASAE*, *44*, 1429–1436.
- Carmo, A. C., de Souza, L. K. C., da Costa, C. E. F., Longo, E., Zamian, J. R., & da Rocha Filho, G. N. (2009). Production of biodiesel by esterification of palmitic acid over mesoporous aluminosilicate Al-MCM-41. *Fuel*, *88*, 461–468.
- Chai, M., Tu, Q., Lu, M., & Yang, Y. J. (2014). Esterification pretreatment of free fatty acid in biodiesel production, from laboratory to industry. *Fuel Processing Technology*, *125*, 106–113.
- Chang, C. F., Chang, C. Y., Hsu, K. E., Lee, S. C., & Höll, W. (2008). Adsorptive removal of the pesticide methomyl using hypercrosslinked polymers. *Journal of Hazardous Materials*, *155*, 295–304.
- Chen, L., Hong, L., Lin, J. C., Meyers, G., Harris, J., & Radler, M. (2016). Epoxy-acrylic core-shell particles by seeded emulsion polymerization. *Journal of Colloid and Interface Science*, *473*, 182–189.
- Chen, X., Ju, Y., & Mou, C. (2007). Direct Synthesis of Mesoporous Sulfated Silica-Zirconia Catalysts with High Catalytic Activity for Biodiesel via Esterification. *Society*, *111*, 18731–18737.

- Chesterfield, D. M., Rogers, P. L., Al-Zaini, E. O., & Adesina, A. A. (2012). Production of biodiesel via ethanolysis of waste cooking oil using immobilised lipase. *Chemical Engineering Journal*, 207-208, 701-710.74-87.
- Cho, S., Kim, C., Yoon, S., & Byun, H. (2015). Phase behavior and characterization of the poly(methyl methacrylate-co-octafluoropentyl methacrylate)[P(MMA-co-OFPPMA)] by supercritical dispersion polymerization. *Fluid Phase Equilibria*, 396,
- Corro, G., Sánchez, N., Pal, U., & Bañuelos, F. (2016). Biodiesel production from waste frying oil using waste animal bone and solar heat. *Waste Management*, 47, 105–113.
- Das, J., & Parida, K. M. (2007). Heteropoly acid intercalated Zn/Al HTlc as efficient catalyst for esterification of acetic acid using n-butanol. *Journal of Molecular Catalysis A: Chemical*, 264, 248–254.
- Davankov, V., Tsyurupa, M., Ilyin, M., & Pavlova, L. (2002). Hypercross-linked polystyrene and its potentials for liquid chromatography: A mini-review. *Journal of Chromatography A*, 965, 65–73.
- De Meireles, A. L. P., Da Silva Rocha, K. A., Kozhevnikov, I. V., & Gusevskaya, E. V. (2011). Esterification of camphene over heterogeneous heteropoly acid catalysts: Synthesis of isobornyl carboxylates. *Applied Catalysis A: General*, 409–410, 82–86.
- De Paiva, E. J. M., Sterchele, S., Corazza, M. L., Murzin, D. Y., Wypych, F., & Salmi, T. (2015). Esterification of fatty acids with ethanol over layered zinc laurate and zinc stearate - Kinetic modeling. *Fuel*, 153, 445–454.
- Deshmane, C. A., Wright, M. W., Lachgar, A., Rohlfing, M., Liu, Z., Le, J., & Hanson, B. E. (2013). A comparative study of solid carbon acid catalysts for the esterification of free fatty acids for biodiesel production. Evidence for the leaching of colloidal carbon. *Bioresource Technology*, 147, 597–604.
- Deshmane, V. G., & Adewuyi, Y. G. (2013). Mesoporous nanocrystalline sulfated zirconia synthesis and its application for FFA esterification in oils. *Applied Catalysis A: General*, 462–463, 196–206.
- Dias, J. M., Alvim-Ferraz, M. C. M., & Almeida, M. F. (2009). Production of biodiesel from acid waste lard. *Bioresource Technology*, 100, 6355–6361.
- Diaz-Felix, W., Riley, M. R., Zimmt, W., & Kazz, M. (2009). Pretreatment of yellow grease for efficient production of fatty acid methyl esters. *Biomass and Bioenergy*, 33, 558–563.
- El-Mashad, H. M., Zhang, R., & Avena-Bustillos, R. J. (2008). A two-step process for biodiesel production from salmon oil. *Biosystems Engineering*, 99, 220–227.
- Energy Commission Malaysia. (2012). *Malaysia Consumption of Energy*. Retrieved from <http://www.st.gov.my/index.php/en/component/k2/item/554-http-www-st-gov-my-index-php-download-page-category-87-annual-reports-html-download-409-energy-commission-annual-report-2012.html> on 17 October 2015.

- Enweremadu, C. C., & Mbarawa, M. M. (2009). Technical aspects of production and analysis of biodiesel from used cooking oil-A review. *Renewable and Sustainable Energy Reviews*, *13*, 2205–2224.
- Fadhil, A. B., Aziz, A. M., & Al-Tamer, M. H. (2016). Biodiesel production from *Silybum marianum* L. seed oil with high FFA content using sulfonated carbon catalyst for esterification and base catalyst for transesterification. *Energy Conversion and Management*, *108*, 255–265.
- Farag, H. A., El-Maghraby, A., & Taha, N. A. (2011). Optimization of factors affecting esterification of mixed oil with high percentage of free fatty acid. *Fuel Processing Technology*, *92*, 507–510.
- Farobie, O., Yanagida, T., & Matsumura, Y. (2014). New approach of catalyst-free biodiesel production from canola oil in supercritical tert-butyl methyl ether (MTBE). *Fuel*, *135*, 172–181.
- Farooq, M., & Ramli, A. (2015). Biodiesel production from low FFA waste cooking oil using heterogeneous catalyst derived from chicken bones. *Renewable Energy*, *76*, 362–368.
- Farooq, M., Ramli, A., & Subbarao, D. (2013). Biodiesel production from waste cooking oil using bifunctional heterogeneous solid catalysts. *Journal of Cleaner Production*, *59*, 131–140.
- Feng, Y., He, B., Cao, Y., Li, J., Liu, M., Yan, F., & Liang, X. (2010). Biodiesel production using cation-exchange resin as heterogeneous catalyst. *Bioresource Technology*, *101*, 1518–1521.
- Fontanals, N., Cormack, P. A. G., Sherrington, D. C., Marcé, R. M., & Borrull, F. (2010). Weak anion-exchange hypercrosslinked sorbent in on-line solid-phase extraction-liquid chromatography coupling to achieve automated determination with an effective clean-up. *Journal of Chromatography A*, *1217*, 2855–2861.
- Fontanals, N., Manesiotis, P., Sherrington, D. C., & Cormack, P. A. G. (2008a). Synthesis of spherical ultra-high-surface-area monodisperse amphiphilic polymer sponges in the low-micrometer size range. *Advanced Materials*, *20*, 1298–1302.
- Fontanals, N., Marcé, R. M., Cormack, P. A. G., Sherrington, D. C., & Borrull, F. (2008b). Monodisperse, hypercrosslinked polymer microspheres as tailor-made sorbents for highly efficient solid-phase extractions of polar pollutants from water samples. *Journal of Chromatography A*, *1191*, 118–124.
- Fontanals, N., Miralles, N., Abdullah, N., Davies, A., Gilart, N., & Cormack, P. A. G. (2014). Evaluation of strong cation-exchange polymers for the determination of drugs by solid-phase extraction-liquid chromatography-tandem mass spectrometry. *Journal of Chromatography A*, *1343*, 55–62.
- Fröhlich, A., & Rice, B. (2009). Sources of methyl ester yield reduction in methanolysis of recycled vegetable oil. *JAOCs, Journal of the American Oil Chemists' Society*, *86*, 269–275.

- Fu, J., Chen, L., Lv, P., Yang, L., & Yuan, Z. (2015). Free fatty acids esterification for biodiesel production using self-synthesized macroporous cation exchange resin as solid acid catalyst. *Fuel*, *154*, 1–8.
- Fu, J., Li, Z., Xing, S., Wang, Z., Miao, C., Lv, P., & Yuan, Z. (2016). Cation exchange resin catalysed biodiesel production from used cooking oil (UCO): Investigation of impurities effect. *Fuel*, *181*, 1058–1065.
- Furuta, S., Matsushashi, H., & Arata, K. (2004). Biodiesel fuel production with solid superacid catalysis in fixed bed reactor under atmospheric pressure. *Catalysis Communications*, *5*, 721–723.
- Gan, S., Ng, H. K., Chan, P. H., & Leong, F. L. (2012). Heterogeneous free fatty acids esterification in waste cooking oil using ion-exchange resins. *Fuel Processing Technology*, *102*, 67–72.
- Garcia, C. M., Teixeira, S., Marciniuk, L. L., & Schuchardt, U. (2008). Transesterification of soybean oil catalyzed by sulfated zirconia. *Bioresource Technology*, *99*, 6608–6613.
- García-Martínez, N., Andreo-Martínez, P., Quesada-Medina, J., de los Ríos, A. P., Chica, A., Beneito-Ruiz, R., & Carratalá-Abril, J. (2016). Optimization of non-catalytic transesterification of tobacco (*Nicotiana tabacum*) seed oil using supercritical methanol to biodiesel production. *Energy Conversion and Management*, *131*, 99–108.
- Geng, L., Yu, G., Wang, Y., & Zhu, Y. (2012). Ph-SO₃H-modified mesoporous carbon as an efficient catalyst for the esterification of oleic acid. *Applied Catalysis A: General*, *427-428*, 137-144
- Ghadge, S. V., & Raheman, H. (2005). Biodiesel production from mahua (*Madhuca indica*) oil having high free fatty acids. *Biomass and Bioenergy*, *28*, 601–605.
- Ghadge, S. V., & Raheman, H. (2006). Process optimization for biodiesel production from mahua (*Madhuca indica*) oil using response surface methodology. *Bioresource Technology*, *97*, 379–384.
- Ghazali, W. W. N. M., Mamat, R., Masjuki, H. H., & Najafi, G. (2015). Effects of biodiesel from different feedstocks on engine performance and emissions: A review. *Renewable and Sustainable Energy Reviews*, *51*, 585–602.
- Giri, B. Y., Rao, K. N., Devi, B. L. A. P., Lingaiah, N., Suryanarayana, I., Prasad, R. B. N., & Prasad, P. S. S. (2005). Esterification of palmitic acid on the ammonium salt of 12-tungstophosphoric acid: The influence of partial proton exchange on the activity of the catalyst. *Catalysis Communications*, *6*, 788–792.
- Gokmen, M. T., & Du Prez, F. E. (2012). Porous polymer particles - A comprehensive guide to synthesis, characterization, functionalization and applications. *Progress in Polymer Science (Oxford)*, *37*, 365–405.

- Gomez, C. G., Pastrana, G., Serrano, D., Zuzek, E., Villar, M. A., & Strumia, M. C. (2012). Macroporous poly(EGDMA-co-HEMA) networks: Morphological characterization from their behaviour in the swelling process. *Polymer (United Kingdom)*, *53*, 2949–2955.
- Guo, F., Fang, Z., Tian, X. F., Long, Y. D., & Jiang, L. Q. (2013). Corrigendum to One-step production of biodiesel from Jatropha oil with high-acid value in ionic liquids. *Bioresource Technology*, *140*, 447–450.
- Gupta, A. R., Yadav, S. V., & Rathod, V. K. (2015). Enhancement in biodiesel production using waste cooking oil and calcium diglycerate as a heterogeneous catalyst in presence of ultrasound. *Fuel*, *158*, 800–806.
- Haigh, K. F., Abidin, S. Z., Vladislavjević, G. T., & Saha, B. (2013). Comparison of Novozyme 435 and Purolite D5081 as heterogeneous catalysts for the pretreatment of used cooking oil for biodiesel production. *Fuel*, *111*, 186–193.
- Hanh, H. D., Dong, N. T., Okitsu, K., Nishimura, R., & Maeda, Y. (2009). Biodiesel production by esterification of oleic acid with short-chain alcohols under ultrasonic irradiation condition. *Renewable Energy*, *34*, 780–783.
- Harwood, H. J. (1984). Oleochemicals as a fuel: Mechanical and economic feasibility. *Journal of the American Oil Chemists' Society*, *61*, 315–324.
- Hasan, Z., Jun, J. W., & Jung, S. H. (2014). Sulfonic acid-functionalized MIL-101(Cr): An efficient catalyst for esterification of oleic acid and vapor-phase dehydration of butanol. *Chemical Engineering Journal*, *278*, 265–271.
- Hayyan, A., Ali Hashim, M., Mjalli, F. S., Hayyan, M., & AlNashef, I. M. (2013). A novel phosphonium-based deep eutectic catalyst for biodiesel production from industrial low grade crude palm oil. *Chemical Engineering Science*, *92*, 81–88.
- Ho, K.-C., Chen, C.-L., Hsiao, P.-X., Wu, M.-S., Huang, C.-C., & Chang, J.-S. (2014). Biodiesel Production from Waste Cooking Oil by Two-step Catalytic Conversion. *Energy Procedia*, *61*, 1302–1305.
- Huang, J., Jin, X., Mao, J., Yuan, B., Deng, R., & Deng, S. (2012). Synthesis, characterization and adsorption properties of diethylenetriamine-modified hypercrosslinked resins for efficient removal of salicylic acid from aqueous solution. *Journal of Hazardous Materials*, *217–218*, 406–415.
- Huang, H., Ding, Y., Chen, X., Chen, Z., & Kong, X. Z. (2016). Synthesis of monodisperse micron-sized poly(divinylbenzene) microspheres by solvothermal precipitation polymerization. *Chemical Engineering Journal*, *289*, 135–141.
- Hykkerud, A., & Marchetti, J. M. (2016). Esterification of oleic acid with ethanol in the presence of Amberlyst 15. *Biomass and Bioenergy*, *95*, 340–343.
- Islam, A., Taufiq-Yap, Y. H., Chu, C.-M., Chan, E.-S., & Ravindra, P. (2013). Studies on design of heterogeneous catalysts for biodiesel production. *Process Safety and Environmental Protection*, *91*, 131–144.

- Ito, T., Sakurai, Y., Kakuta, Y., Sugano, M., & Hirano, K. (2012). Biodiesel production from waste animal fats using pyrolysis method. *Fuel Processing Technology*, *94*, 47–52.
- Jeenpadiphat, S., & Tungasmita, D. N. (2014). Esterification of oleic acid and high acid content palm oil over an acid-activated bentonite catalyst. *Applied Clay Science*, *87*, 272–277.
- Jiang, Y., Lu, J., Sun, K., Ma, L., & Ding, J. (2013). Esterification of oleic acid with ethanol catalyzed by sulfonated cation exchange resin: Experimental and kinetic studies. *Energy Conversion and Management*, *76*, 980–985.
- Jiao, Y., Jiang, J., Zhang, H., Shi, K., & Zhang, H. (2014). Efficient one-pot synthesis of uniform, surface-functionalized and "living" polymer microspheres by reverse atom transfer radical precipitation polymerization. *European Polymer Journal*, *54*, 95–108.
- Jing, H., Wang, X., Liu, Y., & Wang, A. (2015). Preparation of magnetic nanocomposites of solid acid catalysts and their applicability in esterification. *Chinese Journal of Catalysis*, *36*, 244–251.
- Jitputti, J., Kitiyanan, B., Rangsunvigit, P., Bunyakiat, K., Attanatho, L., & Jenvanitpanjakul, P. (2006). Transesterification of crude palm kernel oil and crude coconut oil by different solid catalysts. *Chemical Engineering Journal*, *116*, 61–66.
- Jothiramalingam, R., & Wang, M. K. (2009). Review of recent developments in solid acid, base, and enzyme catalysts (heterogeneous) for biodiesel production via transesterification. *Industrial and Engineering Chemistry Research*, *48*, 6162–6172.
- Kheang, L. O. H. S. O. H., May, C. Y., & Foon, C. S. I. T. (2006). Recovery and Conversion of Palm Olein-Derived Used Frying Oil To Methyl Esters for Biodiesel. *Journal of Oil*, *18*, 247–252.
- Klepáčová, K., Mravec, D., & Bajus, M. (2005). Tert-Butylation of glycerol catalysed by ion-exchange resins. *Applied Catalysis A: General*, *294*, 141–147.
- Kouzu, M., Nakagaito, A., & Hidaka, J. S. (2011). Pre-esterification of FFA in plant oil transesterified into biodiesel with the help of solid acid catalysis of sulfonated cation-exchange resin. *Applied Catalysis A: General*, *405*, 36–44.
- Kuzminska, M., Backoc, R., & Gaigneaux. (2015). Behavior of cation-exchange resins employed as heterogeneous catalysts for esterification of oleic acid with trimethylolpropane. *Applied Catalysis A: General*, *504*, 11–16.
- Laksmono, N., Paraschiv, M., Loubar, K., & Tazerout, M. (2013). Biodiesel production from biomass gasification tar via thermal/catalytic cracking. *Fuel Processing Technology*, *106*, 776–783.
- Lam, M. K., Lee, K. T., & Mohamed, A. R. (2009). Sulfated tin oxide as solid superacid catalyst for transesterification of waste cooking oil: An optimization study. *Applied Catalysis B: Environmental*, *93*, 134–139.

- Lebedevas, S., Vaicekaskas, A., & Lebedeva, G. (2006). Use of Waste Fats of Animal and Vegetable Origin for the Production of Biodiesel Fuel: Quality, Motor Properties, and Emissions of Harmful Components, *Energy & Fuel*, 20, 2274–2280.
- Li, B., Su, F., Luo, H. K., Liang, L., & Tan, B. (2011). Hypercrosslinked microporous polymer networks for effective removal of toxic metal ions from water. *Microporous and Mesoporous Materials*, 138, 207–214.
- Li, M., Zheng, Y., Chen, Y., & Zhu, X. (2014). Biodiesel production from waste cooking oil using a heterogeneous catalyst from pyrolyzed rice husk. *Bioresource Technology*, 154, 345–348.
- Liu, Q. Q., Wang, L., Xiao, A. G., Yu, H. J., & Tan, Q. H. (2008). A hyper-cross-linked polystyrene with nano-pore structure. *European Polymer Journal*, 44, 2516–2522.
- Liu, S., McDonald, T., & Wang, Y. (2010). Producing biodiesel from high free fatty acids waste cooking oil assisted by radio frequency heating. *Fuel*, 89, 2735–2740.
- Liu, Y., Wang, L., & Yan, Y. (2009). Biodiesel synthesis combining pre-esterification with alkali catalyzed process from rapeseed oil deodorizer distillate. *Fuel Processing Technology*, 90, 857–862.
- López, C. B., Esteban Cerdán, L., Robles Medina, A., Navarro López, E., Martín Valverde, L., Hita Peña, Molina Grima, E. (2015). Production of biodiesel from vegetable oil and microalgae by fatty acid extraction and enzymatic esterification. *Journal of Bioscience and Bioengineering*, 119, 706–711.
- López, D. E., Goodwin, J. G., & Bruce, D. A. (2007). Transesterification of triacetin with methanol on Nafion® acid resins. *Journal of Catalysis*, 245, 381–391.
- Lotero, E., Liu, Y. J., Lopez, D. E., Suwannakaran, K., Bruce, D. A., & Goodwin, J. G. (2005). Synthesis of biodiesel via acid catalysis. *Industrial & Engineering Chemistry Research*, 44, 5353–5363.
- Ma, L., Han, Y., Sun, K., Lu, J., & Ding, J. (2015)a. Kinetic and thermodynamic studies of the esterification of acidified oil catalyzed by sulfonated cation exchange resin. *Journal of Energy Chemistry*, 24, 456–462.
- Ma, L., Han, Y., Sun, K., Lu, J., & Ding, J. (2015)b. Optimization of acidified oil esterification catalyzed by sulfonated cation exchange resin using response surface methodology. *Energy Conversion and Management*, 98, 46–53.
- Malins, K., Brinks, J., Kampars, V., & Malina, I. (2016). Esterification of rapeseed oil fatty acids using a carbon-based heterogeneous acid catalyst derived from cellulose. *Applied Catalysis A: General*, 519, 99–106.
- Maneerung, T., Kawi, S., Dai, Y., & Wang, C. H. (2016). Sustainable biodiesel production via transesterification of waste cooking oil by using CaO catalysts prepared from chicken manure. *Energy Conversion and Management*, 123, 487–497.

- Mattsson, J., Hedström, A., Viklander, M., & Blecken, G.-T. (2014). Fat, Oil, and Grease Accumulation in Sewer Systems: Comprehensive Survey of Experiences of Scandinavian Municipalities. *Journal of Environmental Engineering*, *140*, 1943–7870.
- Meng, Q. B., Yang, G. S., & Lee, Y. S. (2013). Preparation of highly porous hypercrosslinked polystyrene adsorbents: Effects of hydrophilicity on the adsorption and microwave-assisted desorption behavior toward benzene. *Microporous and Mesoporous Materials*, *181*, 222–227.
- Meng, Q. B., Yang, G. S., & Lee, Y. S. (2014). Sulfonation of a hypercrosslinked polymer adsorbent for microwave-assisted desorption of adsorbed benzene. *Journal of Industrial and Engineering Chemistry*, *20*, 2484–2489.
- Moecke, E. H. S., Feller, R., Santos, H. A. dos, Machado, M. de M., Cubas, A. L. V., Dutra, A. R. de A., Soares, S. R. (2016). Biodiesel production from waste cooking oil for use as fuel in artisanal fishing boats: Integrating environmental, economic and social aspects. *Journal of Cleaner Production*, *135*, 679–688.
- Mofijur, M., Masjuki, H. H., Kalam, M. A., Ashrafur Rahman, S. M., & Mahmudul, H. M. (2015). Energy scenario and biofuel policies and targets in ASEAN countries. *Renewable and Sustainable Energy Reviews*, *46*, 51–61.
- Mohammed, N. I., Kabbashi, N. A., Alam, M. Z., & Mirghani, M. E. S. (2015). Esterification of *Jatropha curcas* hydrolysate using powdered niobic acid catalyst. *Journal of the Taiwan Institute of Chemical Engineers*, *63*, 243–249.
- Murugesan, A., Umarani, C., Chinnusamy, T. R., Krishnan, M., Subramanian, R., & Neduzchezain, N. (2009). Production and analysis of bio-diesel from non-edible oils-A review. *Renewable and Sustainable Energy Reviews*, *13*, 825–834.
- Naik, M., Meher, L. C., Naik, S. N., & Das, L. M. (2008). Production of biodiesel from high free fatty acid Karanja (*Pongamia pinnata*) oil. *Biomass and Bioenergy*, *32*, 354–357.
- Nainwal, S., Sharma, N., Sharma, A. Sen, Jain, S., & Jain, S. (2015). Cold flow properties improvement of *Jatropha curcas* biodiesel and waste cooking oil biodiesel using winterization and blending. *Energy*, *89*, 702–707.
- Naresh Muthu, R., Rajashabala, S., & Kannan, R. (2015). Synthesis and characterization of polymer (sulfonated poly-ether-ether-ketone) based nanocomposite (h-boron nitride) membrane for hydrogen storage. *International Journal of Hydrogen Energy*, *40*, 1836–1845.
- Nas, B., & Berktaý. (2007). Energy Potential of Biodiesel Generated from Waste Cooking Oil: An Environmental Approach. *Energy Sources, Part B: Economics, Planning, and Policy*, *2*, 63–71.
- Neumann, K., Werth, K., Martín, A., & Górak, A. (2016). Biodiesel production from waste cooking oils through esterification: Catalyst screening, chemical equilibrium and reaction kinetics. *Chemical Engineering Research and Design*, *107*, 52–62.

- Ngo, T. P. N., Li, A., Tiew, K. W., & Li, Z. (2013). Efficient transformation of grease to biodiesel using highly active and easily recyclable magnetic nanobiocatalyst aggregates. *Bioresource Technology*, *145*, 233–239.
- Nikoshvili, L., Shimanskaya, E., Bykov, A., Yuranov, I., Kiwi-Minsker, L., & Sulman, E. (2015). Selective hydrogenation of 2-methyl-3-butyn-2-ol over Pd-nanoparticles stabilized in hypercrosslinked polystyrene: Solvent effect. *Catalysis Today*, *241*, 179–188.
- Nisar, J., Razaq, R., Farooq, M., Iqbal, M., Ali, R., Sayed, M., & Shah, A. (2017). Enhanced biodiesel production from Jatropha oil using calcined waste animal bones as catalyst. *Renewable Energy*, *101*, 111–119.
- Okuhara, T. (2002). Water-tolerant solid acid catalysts. *Chemical Reviews*, *102*, 3641–3666.
- Oliveira, C. F., Dezaneti, L. M., Garcia, F. A. C., de Macedo, J. L., Dias, J. A., Dias, S. C. L., & Alvim, K. S. P. (2010). Esterification of oleic acid with ethanol by 12-tungstophosphoric acid supported on zirconia. *Applied Catalysis A: General*, *372*, 153–161.
- Ong, H. R., Khan, M. R., Chowdhury, M. N. K., Yousuf, A., & Cheng, C. K. (2014). Synthesis and characterization of CuO/C catalyst for the esterification of free fatty acid in rubber seed oil. *Fuel*, *120*, 195–201.
- Otadi, M., Shahraki, A., Goharrokhi, M., & Bandarchian, F. (2011). Reduction of free fatty acids of waste oil by acid-catalyzed esterification. *Procedia Engineering*, *18*, 168–174.
- Özbay, N., Oktar, N., & Tapan, N. A. (2008). Esterification of free fatty acids in waste cooking oils (WCO): Role of ion-exchange resins. *Fuel*, *87*, 1789–1798.
- Pan, B. C., Xiong, Y., Li, A. M., Chen, J. L., Zhang, Q. X., & Jin, X. Y. (2002). Adsorption of aromatic acids on an aminated hypercrosslinked macroporous polymer. *Reactive and Functional Polymers*, *53*, 63–72.
- Park, J. Y., Kim, D. K., & Lee, J. S. (2010). Esterification of free fatty acids using water-tolerable Amberlyst as a heterogeneous catalyst. *Bioresource Technology*, *101*, 62–65.
- Pastore, C., Barca, E., Del Moro, G., Lopez, A., Mininni, G., & Mascolo, G. (2015). Recoverable and reusable aluminium solvated species used as a homogeneous catalyst for biodiesel production from brown grease. *Applied Catalysis A: General*, *501*, 48–55.
- Pesaresi, L., Brown, D. R., Lee, A. F., Montero, J. M., Williams, H., & Wilson, K. (2009). Cs-doped H₄SiW₁₂O₄₀ catalysts for biodiesel applications. *Applied Catalysis A: General*, *360*, 50–58.

- Prabhavathi Devi, B. L. A., Vijai Kumar Reddy, T., Vijaya Lakshmi, K., & Prasad, R. B. N. (2014). A green recyclable SO₃H-carbon catalyst derived from glycerol for the production of biodiesel from FFA-containing karanja (*Pongamia glabra*) oil in a single step. *Bioresource Technology*, *153*, 370–373.
- Pukale, D. D., Maddikeri, G. L., Gogate, P. R., Pandit, A. B., & Pratap, A. P. (2015). Ultrasound assisted transesterification of waste cooking oil using heterogeneous solid catalyst. *Ultrasonics Sonochemistry*, *22*, 278–286.
- Rahman, M. B. A., Jumbri, K., Mohd Ali Hanafiah, N. A., Abdulmalek, E., Tejo, B. A., Basri, M., & Salleh, A. B. (2012). Enzymatic esterification of fatty acid esters by tetraethylammonium amino acid ionic liquids-coated *Candida rugosa* lipase. *Journal of Molecular Catalysis B: Enzymatic*, *79*, 61–65.
- Ramadhas, A. S., Jayaraj, S., & Muraleedharan, C. (2005). Biodiesel production from high FFA rubber seed oil. *Fuel*, *84*, 335–340.
- Rodrigo, R., Toro, C. A., & Ceullar, J. (2013). Morphological characteristics of poly(styrene-co-divinylbenzene) microparticles synthesized by suspension polymerization. *Powder Technology*, *247*, 279–288.
- Sajjadi, B., Raman, A. A. A., & Arandiyani, H. (2016). A comprehensive review on properties of edible and non-edible vegetable oil-based biodiesel: Composition, specifications and prediction models. *Renewable and Sustainable Energy Reviews*, *63*, 62–92.
- Šálek, P., & Horák, D. (2011). Hypercrosslinked polystyrene microspheres by suspension and dispersion polymerization. *E-Polymers*, *11*, 1–12.
- Santiago-Torres, N., Romero-Ibarra, I. C., & Pfeiffer, H. (2014). Sodium zirconate (Na₂ZrO₃) as a catalyst in a soybean oil transesterification reaction for biodiesel production. *Fuel Processing Technology*, *120*, 34–39.
- Sharma, Y. C., & Singh, B. (2008). Development of biodiesel from karanja, a tree found in rural India. *Fuel*, *87*, 1740–1742.
- Sharma, Y. C., Singh, B., & Upadhyay, S. N. (2008). Advancements in development and characterization of biodiesel: A review. *Fuel*, *87*, 2355–2373.
- Shi, W., Li, J., He, B., Yan, F., Cui, Z., Wu, K., Cheng, Y. (2013). Biodiesel production from waste chicken fat with low free fatty acids by an integrated catalytic process of composite membrane and sodium methoxide. *Bioresource Technology*, *139*, 316–322.
- Shibasaki-Kitakawa, N., Tsuji, T., Chida, K., Kubo, M., & Yonemoto, T. (2010). Simple continuous production process of biodiesel fuel from oil with high content of free fatty acid using ion-exchange resin catalysts. *Energy & Fuels*, *24*, 3634–3638.
- Sing, K. S. W., Everett, D. H., Haul, R. A. W., Moscou, L., Pierotti, R. A., Rouquerol, J., & Siemiewska, T. (1985). Reporting physisorption data for gas/solid systems. *Pure Applied Chemistry*, *57*, 603–619.

- Soares Dias, A. P., Puna, J., Gomes, J., Neiva Correia, M. J., & Bordado, J. (2016). Biodiesel production over lime. Catalytic contributions of bulk phases and surface Ca species formed during reaction. *Renewable Energy*, *99*, 622–630.
- Soltani, S., Rashid, U., Al-Resayes, S. I., & Nehdi, I. A. (2016). Recent progress in synthesis and surface functionalization of mesoporous acidic heterogeneous catalysts for esterification of free fatty acid feedstocks: A review. *Energy Conversion and Management*, *141*, 183-205.
- Son, S. M., Kimura, H., & Kusakabe, K. (2011). Esterification of oleic acid in a three-phase, fixed-bed reactor packed with a cation exchange resin catalyst. *Bioresource Technology*, *102*, 2130–2132.
- Song, J., & Winnik, M. A. (2005). Cross-Linked, Monodisperse, Micron-Sized Polystyrene Particles by Two-Stage Dispersion Polymerization. *Macromolecules*, *38*, 8300–8307.
- Souillard, C., Cavaillé, J. Y., Chazeau, L., & Schach, R. (2014). Dynamic mechanical relaxation of cross-linked styrene-butadiene polymers containing free chains: Possibility of reptation. *Polymer (United Kingdom)*, *55*, 5218–5225.
- Su, E., & Wei, D. (2014). Improvement in biodiesel production from soapstock oil by one-stage lipase catalyzed methanolysis. *Energy Conversion and Management*, *88*, 60–65.
- Sun, H., Ding, Y., Duan, J., Zhang, Q., Wang, Z., Lou, H., & Zheng, X. (2010). Transesterification of sunflower oil to biodiesel on ZrO₂ supported La₂O₃ catalyst. *Bioresource Technology*, *101*, 953–958.
- Suresh, R., Antony, J. V., Vengalil, R., Kochimoolayil, G. E., & Joseph, R. (2017). Esterification of free fatty acids in non- edible oils using partially sulfonated polystyrene for biodiesel feedstock. *Industrial Crops and Products*, *95*, 66–74.
- Talebian-Kiakalaieh, A., Amin, N. A. S., & Mazaheri, H. (2013a). A review on novel processes of biodiesel production from waste cooking oil. *Applied Energy*, *104*, 683–710.
- Talebian-Kiakalaieh, A., Amin, N. A. S., Zarei, A., & Noshadi, I. (2013b). Transesterification of waste cooking oil by heteropoly acid (HPA) catalyst: Optimization and kinetic model. *Applied Energy*, *102*, 283–292.
- Tariq, M., Ali, S., & Khalid, N. (2012). Activity of homogeneous and heterogeneous catalysts, spectroscopic and chromatographic characterization of biodiesel: A review. *Renewable and Sustainable Energy Reviews*, *16*, 6303–6316.
- Tesser, R., Di Serio, M., Guida, M., Nastasi, M., & Santacesaria, E. (2005). Kinetics of oleic acid esterification with methanol in the presence of triglycerides. *Industrial and Engineering Chemistry Research*, *44*, 7978–7982.
- Thiruvengadaravi, K. V., Nandagopal, J., Baskaralingam, P., Sathya Selva Bala, V., & Sivanesan, S. (2012). Acid-catalyzed esterification of karanja (*Pongamia pinnata*) oil with high free fatty acids for biodiesel production. *Fuel*, *98*: 1–4.

- Tian, K., & Li, Z. (2016). High-yielding, one-pot, and green production of biodiesel from waste grease using wet cells of a recombinant *Escherichia coli* strain as catalyst. *Biochemical Engineering Journal*, *115*, 30–37.
- Torres-Rodríguez, D. A., Romero-Ibarra, I. C., Ibarra, I. A., & Pfeiffer, H. (2016). Biodiesel production from soybean and *Jatropha* oils using cesium impregnated sodium zirconate as a heterogeneous base catalyst. *Renewable Energy*, *93*, 323–331.
- Tsyurupa, M. P., Ilyin, M. M., Andreeva, A. I., & Davankov, V. A. (1995). Use of the hyper-crosslinked polystyrene sorbents “Styrosorb” for solid phase extraction of phenols from water. *Fresenius' Journal of Analytical Chemistry*, *352*, 672–675.
- Tyson, K. S., & McCormick, R. I. (2009). *Biodiesel Handling and Use Guide: Fourth Edition (Revised)*. National Renewable Energy Laboratory (4th ed.). Springfield: VA.National Technical, Information Service.DOE/GO-102006-2358.
- Ullah, Z., Bustam, M. A., & Man, Z. (2015). Biodiesel production from waste cooking oil by acidic ionic liquid as a catalyst. *Renewable Energy*, *77*, 521–526.
- Urrutia, C., Sangaletti-Gerhard, N., Cea, M., Suazo, A., Aliberti, A., & Navia, R. (2016). Two step esterification-transesterification process of wet greasy sewage sludge for biodiesel production. *Bioresource Technology*, *200*, 1044–1049.
- Veillette, M., Giroir-Fendler, A., Faucheux, N., & Heitz, M. (2017). Esterification of free fatty acids with methanol to biodiesel using heterogeneous catalysts: From model acid oil to microalgae lipids. *Chemical Engineering Journal*, *308*, 101–109.
- Veljković, V. B., Lakićević, S. H., Stamenković, O. S., Todorović, Z. B., & Lazić, M. L. (2006). Biodiesel production from tobacco (*Nicotiana tabacum* L.) seed oil with a high content of free fatty acids. *Fuel*, *85*, 2671–2675.
- Verma, P., & Sharma, M. P. (2016). Review of process parameters for biodiesel production from different feedstocks. *Renewable and Sustainable Energy Reviews*, *62*, 1063–1071.
- Wang, L., Dong, X., Jiang, H., Li, G., & Zhang, M. (2014a). Ordered mesoporous carbon supported ferric sulfate: A novel catalyst for the esterification of free fatty acids in waste cooking oil. *Fuel Processing Technology*, *128*, 10–16.
- Wang, X., Dai, K., Chen, L., Huang, J., & Liu, Y. N. (2014b). An ethylenediamine-modified hypercrosslinked polystyrene resin: Synthesis, adsorption and separation properties. *Chemical Engineering Journal*, *242*, 19–26.
- Wang, X., Huang, J., & Huang, K. (2010). Surface chemical modification on hyper-cross-linked resin by hydrophilic carbonyl and hydroxyl groups to be employed as a polymeric adsorbent for adsorption of p-aminobenzoic acid from aqueous solution. *Chemical Engineering Journal*, *162*, 158–163.
- Weidenthaler, C. (2011). Pitfalls in the characterization of nanoporous and nanosized materials. *Nanoscale*, *3*, 792-810.

- Wichaita, W., Polpanich, D., Suteewong, T., & Tangboriboonrat, P. (2016). Hollow core-shell particles via NR latex seeded emulsion polymerization. *Polymer (United Kingdom)*, *99*, 324–331.
- Wu, X., & Leung, D. Y. C. (2011). Optimization of biodiesel production from camelina oil using orthogonal experiment. *Applied Energy*, *88*, 3615–3624.
- Xie, W., Qi, C., Wang, H., & Liu, Y. (2014). Phenylsulfonic acid functionalized mesoporous SBA-15 silica: A heterogeneous catalyst for removal of free fatty acids in vegetable oil. *Fuel Processing Technology*, *119*, 98–104.
- Yadav, A. K., Khan, M. E., Dubey, A. M., & Pal, A. (2016). Performance and emission characteristics of a transportation diesel engine operated with non-edible vegetable oils biodiesel. *Case Studies in Thermal Engineering*, *8*, 236–244.
- Yahya, N. Y., Ngadi, N., Jusoh, M., & Halim, N. A. A. (2016). Characterization and parametric study of mesoporous calcium titanate catalyst for transesterification of waste cooking oil into biodiesel. *Energy Conversion and Management*, *129*, 275–283.
- Yan, J., Li, A., Xu, Y., Ngo, T. P. N., Phua, S., & Li, Z. (2012). Efficient production of biodiesel from waste grease: One-pot esterification and transesterification with tandem lipases. *Bioresource Technology*, *123*, 332–337.
- Yuan, X., Li, X., Zhu, E., Hu, J., Sheng, W., & Cao, S. (2008). A novel hypercrosslinked polymeric adsorbent modified by phenolic hydroxyl group of 2-naphthol with bromoethane as crosslinking reagent. *Carbohydrate Polymers*, *74*, 468–473.
- Yunus, N. B. M., Roslan, N. A. B., Yee, C. S., & Abidin, S. Z. (2016). Esterification of Free Fatty Acid in Used Cooking Oil Using Gelular Exchange Resin as Catalysts. *Procedia Engineering*, *148*, 1274–1281.
- Zeng, S. Z., Guo, L., He, Q., Chen, Y., Jiang, P., & Shi, J. (2010a). Facile one-pot synthesis of nanoporous hypercrosslinked hydroxybenzene formaldehyde resins with high surface area and adjustable pore texture. *Microporous and Mesoporous Materials*, *131*, 141–147.
- Zeng, X., Yu, T., Wang, P., Yuan, R., Wen, Q., Fan, Y., Shi, R. (2010b). Preparation and characterization of polar polymeric adsorbents with high surface area for the removal of phenol from water. *Journal of Hazardous Materials*, *177*, 773–780.
- Zhang, H., Aytun Ozturk, U., Wang, Q., & Zhao, Z. (2014a). Biodiesel produced by waste cooking oil: Review of recycling modes in China, the US and Japan. *Renewable and Sustainable Energy Reviews*, *38*, 677–685.
- Zhang, Y., Wong, W. T., & Yung, K. F. (2014b). Biodiesel production via esterification of oleic acid catalyzed by chlorosulfonic acid modified zirconia. *Applied Energy*, *116*, 191–198.

- Zhang, S., Zu, Y. G., Fu, Y. J., Luo, M., Zhang, D. Y., & Efferth, T. (2010). Rapid microwave-assisted transesterification of yellow horn oil to biodiesel using a heteropolyacid solid catalyst. *Bioresource Technology*, *101*, 931–936.
- Zhang, X., Li, J., Chen, Y., Wang, J., Feng, L., Wang, X., & Cao, F. (2009). Heteropolyacid nanoreactor with double acid sites as a highly efficient and reusable catalyst for the transesterification of waste cooking oil. *Energy and Fuels*, *23*, 4640–4646.
- Zhang, Y., Dubé, M. A., McLean, D. D., & Kates, M. (2003). Biodiesel production from waste cooking oil: 1. Process design and technological assessment. *Bioresource Technology*, *89*, 1–16.
- Zhao, L., Zhang, X., Lü, X., Yuan, S., & Wu, X. (2013). Two organic phase suspension polymerization for novel hypercrosslinked resin bead by polycondensation of CMB. *Chinese Journal of Chemical Engineering*, *21*, 447–452.
- Zhao, Y., Fu, Y., Hu, B., & Lü, C. (2016). Quaternized graphene oxide modified ionic cross-linked sulfonated polymer electrolyte composite proton exchange membranes with enhanced properties. *Solid State Ionics*, *294*, 43–53.
- Zhou, Y., Niu, S., & Li, J. (2016). Activity of the carbon-based heterogeneous acid catalyst derived from bamboo in esterification of oleic acid with ethanol. *Energy Conversion and Management*, *114*, 188–196.
- Zieba, A., Matachowski, L., Gurgul, J., Bielańska, E., & Drelinkiewicz, A. (2009). Transesterification reaction of triglycerides in the presence of Ag-doped H3PW12O40. *Journal of Molecular Catalysis A: Chemical*, *316*, 30–44.
- Zuo, D., Lane, J., Culy, D., Schultz, M., Pullar, A., & Waxman, M. (2013). Sulfonic acid functionalized mesoporous SBA-15 catalysts for biodiesel production. *Applied Catalysis B: Environmental*, *129*, 342–350.